

HALF-LIFE[®] 2

RAISING THE BAR



H A L F - L I F E[®] 2

R A I S I N G T H E B A R



HALF-LIFE²

RAISING THE BAR

By Valve

With:

Contributing Editor: David SJ Hodgson

Product Manager: Jill Hinckley

Senior Project Editor: Brooke N. Hall

Editorial Supervisor: Christy Seifert

Senior Designer: Marc W. Riegel

Designer: Melissa Francis

Editorial Assistant: Tamar D. Foster



PRIMA GAMES
A DIVISION OF
RANDOM HOUSE, INC.

3000 Lava Ridge Court
Roseville, CA 95661
1-800-733-3000
www.primagames.com

The Prima Games logo is a registered trademark of Random House, Inc., registered in the United States and other countries. Primagames.com is a registered trademark of Random House, Inc.

© 2004 Valve Corporation. All rights reserved. Valve, the Valve logo, Half-Life, the Half-Life logo, the Lambda logo, Team Fortress, Day of Defeat, Counter-Strike, and Source are trademarks and/or registered trademarks of Valve Corporation.

All products and characters mentioned in this book are trademarks of their respective companies.

ISBN: 0-7615-4364-3

Library of Congress Catalog Card Number: 2003108420

Printed in the United States of America

04 05 06 07 LL 10 9 8 7 6 5 4 3 2 1

CONTENTS

.f	Foreword by Gabe Newell	05
.i¹	Investigation 1: Anomalous Materials	
.01	Half-Life: A Nonstandard Specimen	08
.02	Extra Life: The Mod Movement	44
.i²	Investigation 2: Unexpected Interference	
.03	Half-Life 2: Creature Discomforts	70
.04	Half-Life 2: Digital Drama	118
.05	Half-Life 2: Welcome to City 17	160
.06	Half-Life 2: Final Sequence	254



FOREWORD BY GABE NEWELL

As I write this, I have the world's worst case of stage fright. After six years and tens of millions of dollars, after break-ins and lawsuits, after marriages and children and divorces and deaths, we're about to ship *Half-Life 2*. You, the reader, know how the launch of *Half-Life 2* went. You have read the reviews, seen the sales figures, heard about awards (or the lack thereof), and best of all, you've played the finished game. We've done none of these. Did we create a worthy successor to *Half-Life*? Did we live up to gamer's expectations? *Did we pull it off?* You know, and I don't, and that seems terribly unfair to me right now.

What also seems terribly unfair to me is the disproportionate credit I receive for Valve's success. I am part of a team, and part of what I do is act as a public face for the corporation (for example, writing forewords). One thing I hope you take away from this book is a clearer sense of just how much work is involved, how much creativity is required to build a game. There may be some games that are created by *auteurs*, a single driving vision surrounded by an army of obedient servants, but I don't think a game like *Half-Life 2* can be created that way. For anyone on the team, I can list all of the things that would have been lost if they hadn't been part of the creation of the game. There is a myth that gets told about the solitary writer, the autocratic director, the Napoleonic CEO that just doesn't ring true to me anymore, having been part of the collaborative process at Valve.

We are also part of the larger game community. One of the unique characteristics of games as a medium is that you have to create it in cooperation with the audience. A multiplayer game is only as fun as the other people you are playing with. A single-player game is really a movie that you create in cooperation with the player, where the lead actor doesn't have a copy of the script. A game engine is not just the platform for the game itself, but a platform for all the MODs that come along to extend the life and enjoyment of the experience. While you'll see little evidence of this larger community in *Half-Life 2: Raising the Bar*, be aware that everyone at Valve is acutely aware of our role in that larger community, the contributions that community makes to the success of our endeavors, and our deep gratitude for their support over the years.

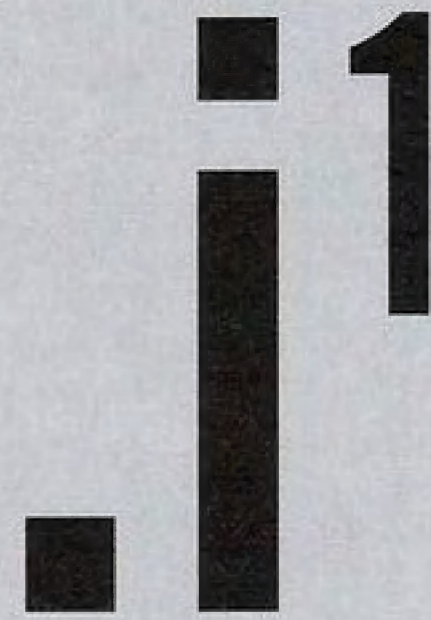
Gabe Newell
8.11.04
Bellevue, Washington



ALIEN 2



Investigation 1: Anomalous Materials



Building a world from the ground up is not a task to be taken lightly, but in a sense, that was the challenge facing Gabe Newell and Mike Harrington in 1996. Retired Microsoft developers, Gabe and Mike shared a vision of the future of gaming, but neither of them could have known how far their dream would lead. From the very beginning, their approach relied on maverick risk-taking and a foundation of solid business planning. It was a sound, easily justifiable decision to license the robust *Quake* engine from *Quake* and *Doom* creators, id Software; it was a sensible decision to proceed to work quietly, without any hype whatsoever, in the small Seattle suburb of Kirkland, Washington; and it made perfect sense to start building what was essentially a fast-paced First-Person Shooter with a simple intuitive interface, and plenty of combat with alien monsters. What was not so obviously safe and sane was to hire many of the company's first employees from the excitable ranks of *Quake*'s own mod community: young programmers and level designers who spent their days delivering pizzas and their nights cranking out monster-infested nightclubs and rule-bending deathmatch maps. From the very beginning, Valve tapped into the essence of the gaming community, encouraging direct creative input from those who loved games so much that they couldn't help but make their own.



Half-Life: A Nonstandard Specimen

.01

Setting to work, Valve initially staffed two design teams. The project codenamed *Quiver* was to be a First-Person Shooter in the vein of *Doom*, with emphasis on aliens, ammo, and adrenaline. The other project, called *Prospero*, was to be a moody, literary game, drawing on sources ranging from *Myst* to Borges. As *Half-Life* gathered critical mass, it gradually absorbed every member of the company, spelling the demise of *Prospero*, but also bringing more emphasis on narrative and atmosphere to *Half-Life*. Meanwhile, it became clear to Valve's founders that *Half-Life* was just not going to be good enough unless the reconstituted team had time to rethink and rebuild the game from the ground up. In late 1997, Gabe and Mike set back the hands of the clock, giving the team an additional year to develop and refine *Half-Life*. The additional incubation time made all the difference in the world.

Prospero

Greg Coomer

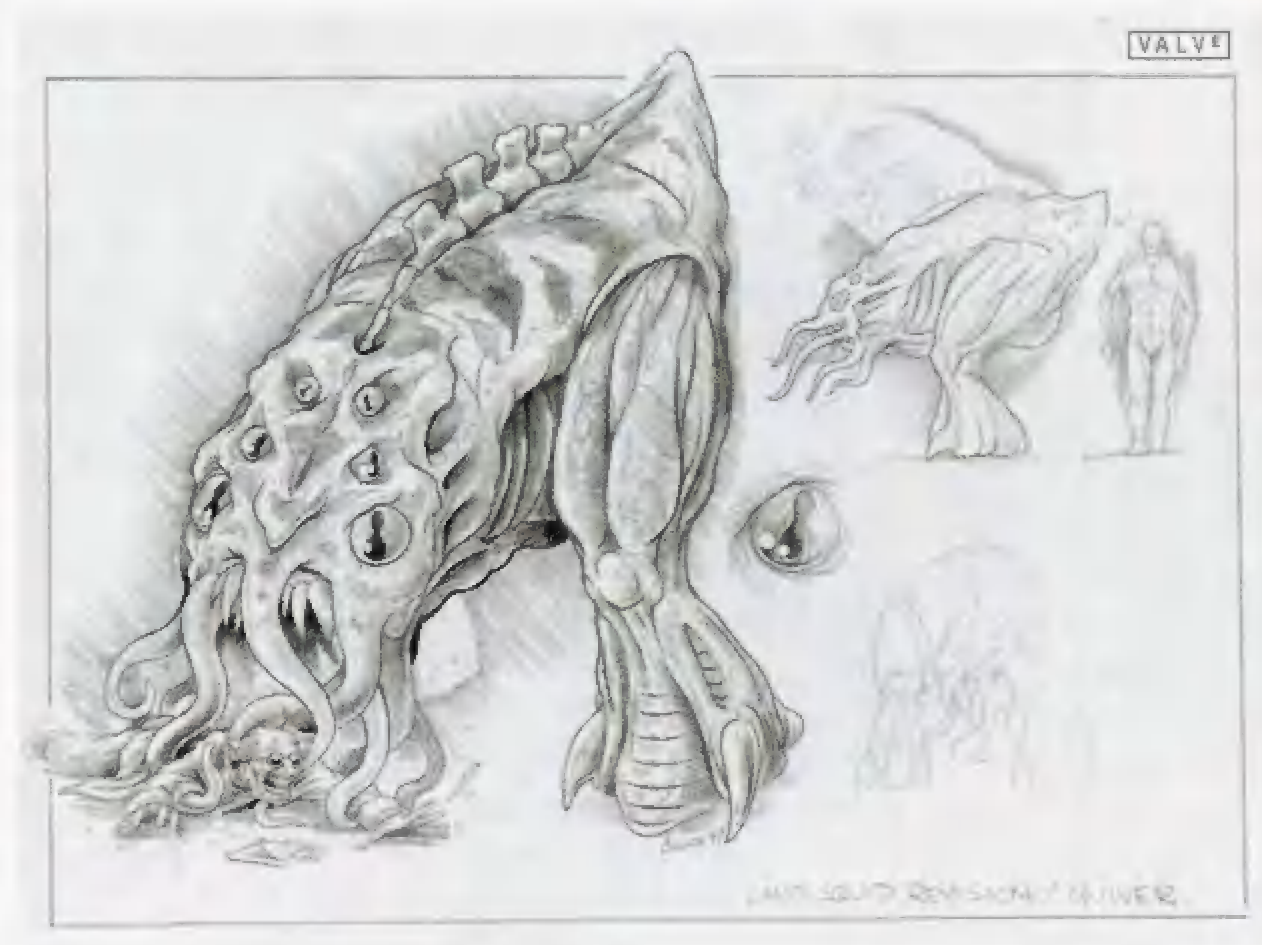
Prospero was one of Valve's first game designs. Originally slated to come out shortly after *Half-Life*, the game emphasized exploration, an intricate storyline, and combat via "psionic" powers. *Prospero*'s heroine (known as "The Librarian" or "Aleph") underwent a series of design changes during the early development of the game. One iteration relied heavily on the use of hardware psionic amplifiers to augment her innate abilities.

As the design of *Quiver* started to take over some of *Prospero*'s initial goals, *Prospero* started to change into a massively multiplayer game. *Prospero* was also intended to be distributed, with a complicated mix of Valve and user-created worlds accessed through the in-game "library," each world running on a different server. Online distribution, a server browser, a friend finder, and other ambitions initially developed for *Prospero* never quite died, but found a new home in what was to eventually become *Half-Life*, as well as Steam.



Quiver Creature Concepts Chuck Jones

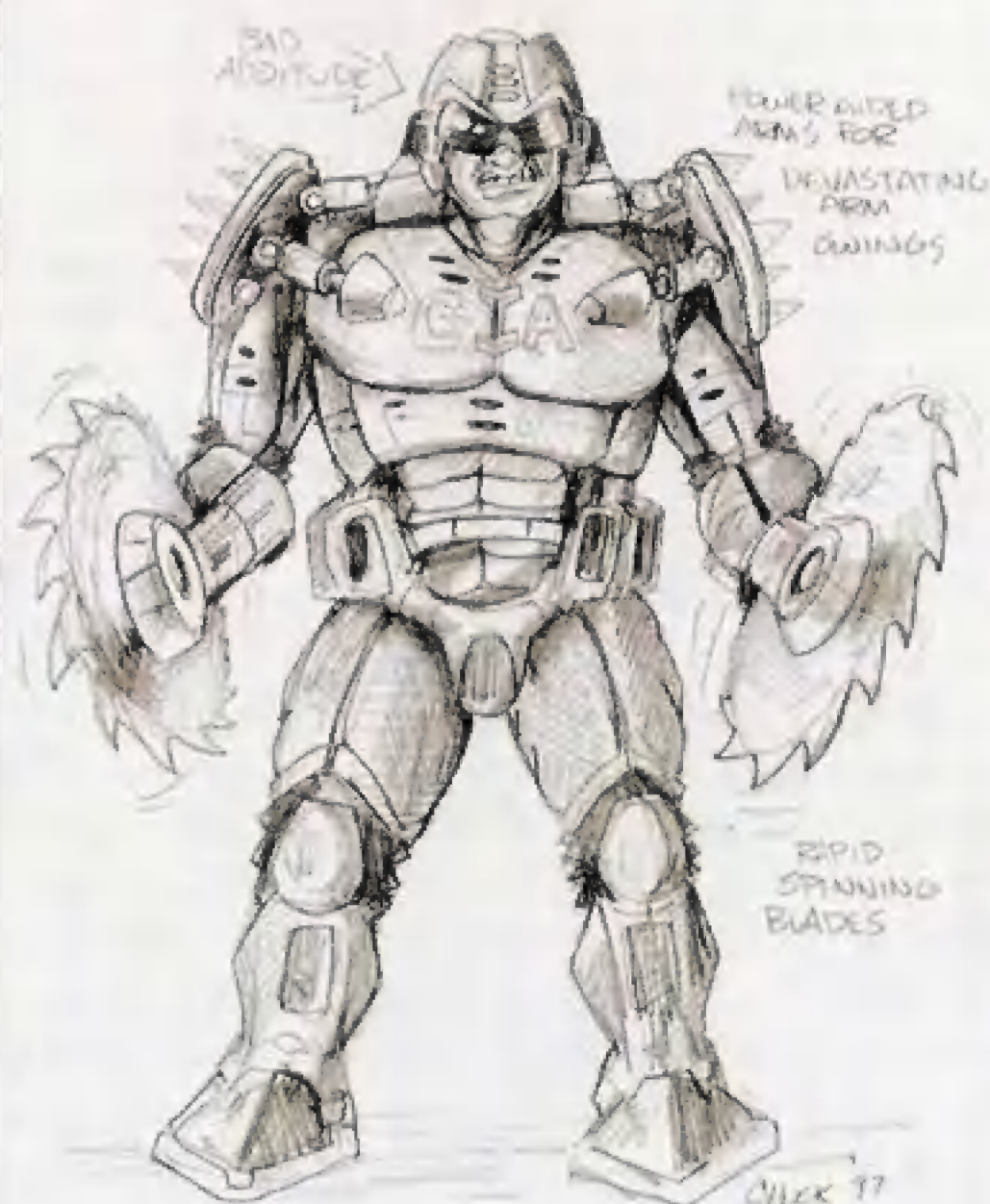
Half-Life's original design was codenamed *Quiver*, in reference to Stephen King's influential story "The Mist," in which monsters swarm out of a military base known as Arrowhead. This name also suggests that it was originally conceived as a minor cousin to *Quake*. By the time the name *Half-Life* was decided, the game had already taken on its own strong personality, quite distinct from other games of the time.



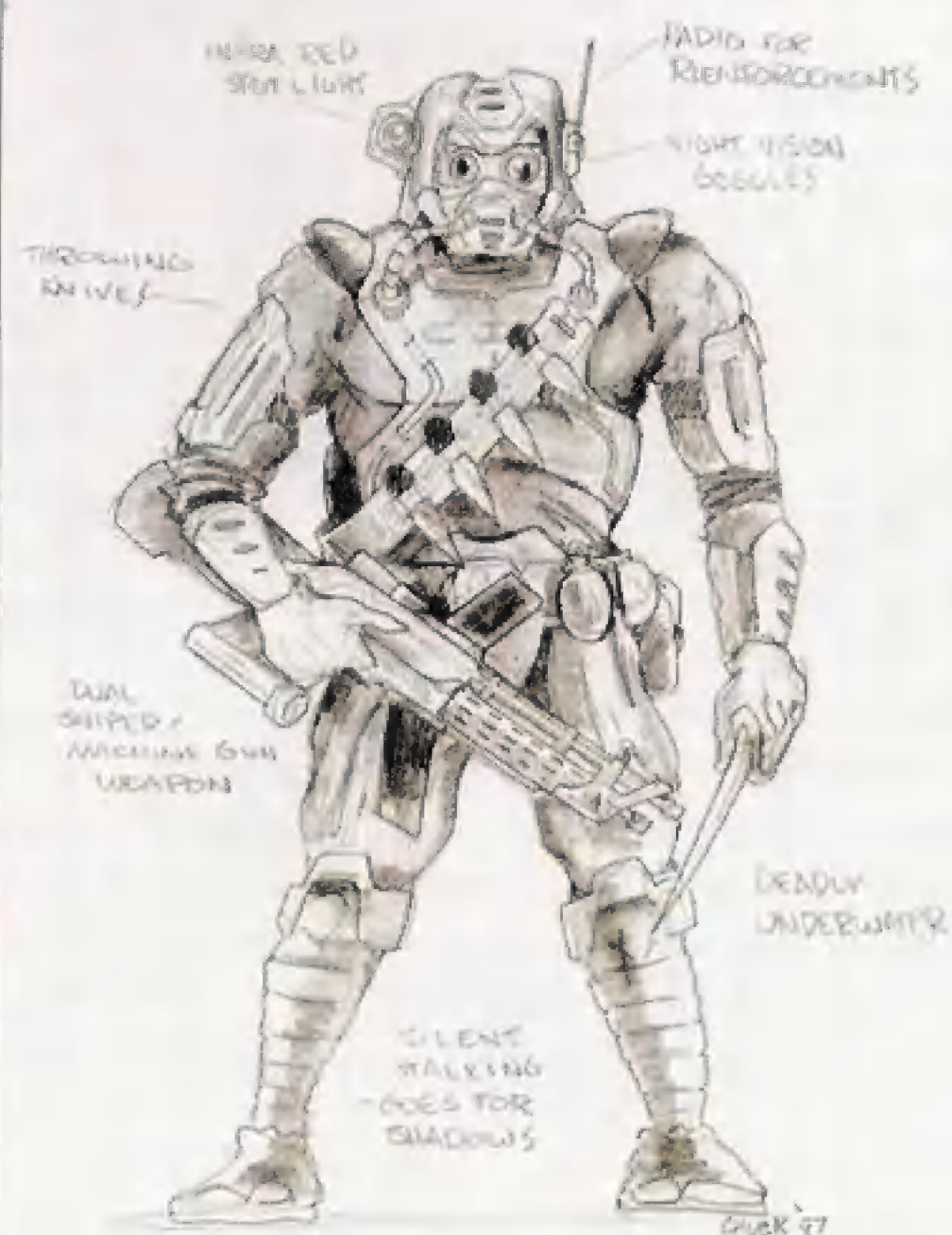
VALVE

CHUCK JONES '9

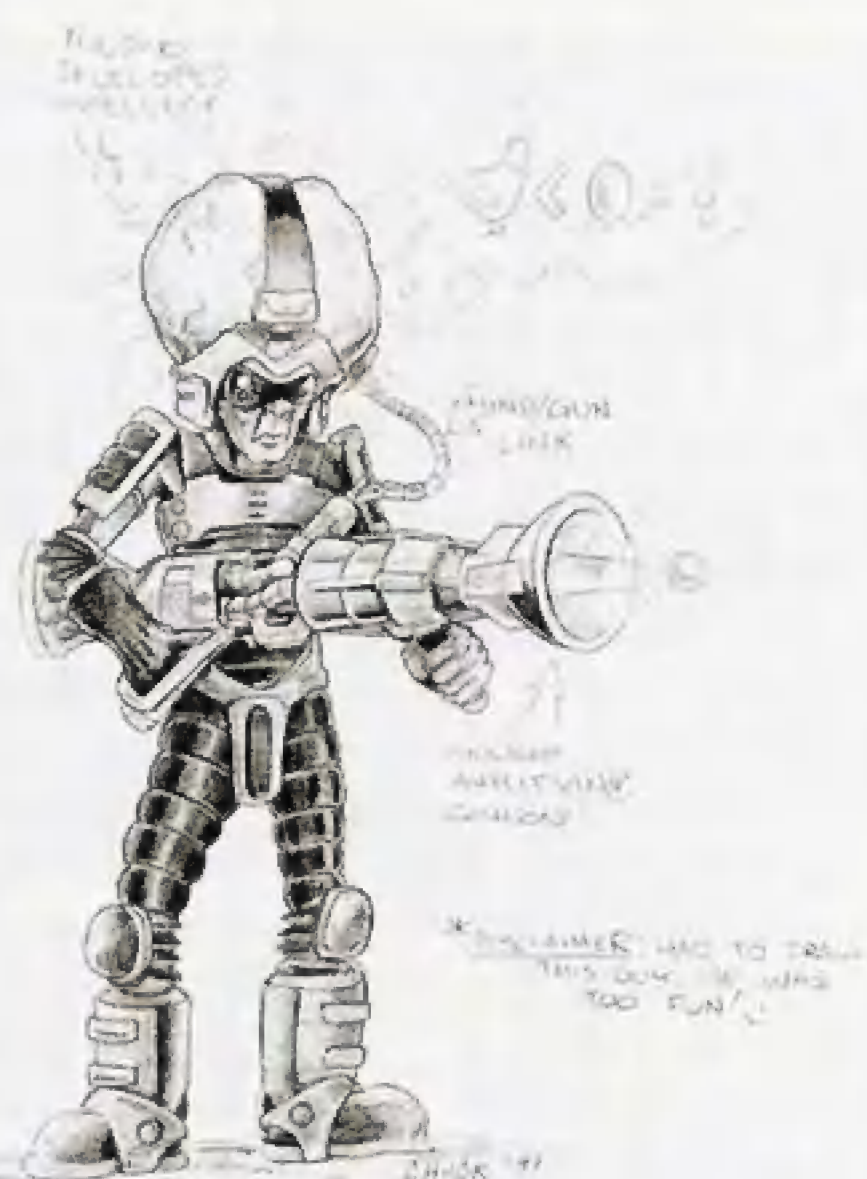
SPECIAL UNIT. AKA "THE BUTCHER" / CIA SOLDIER



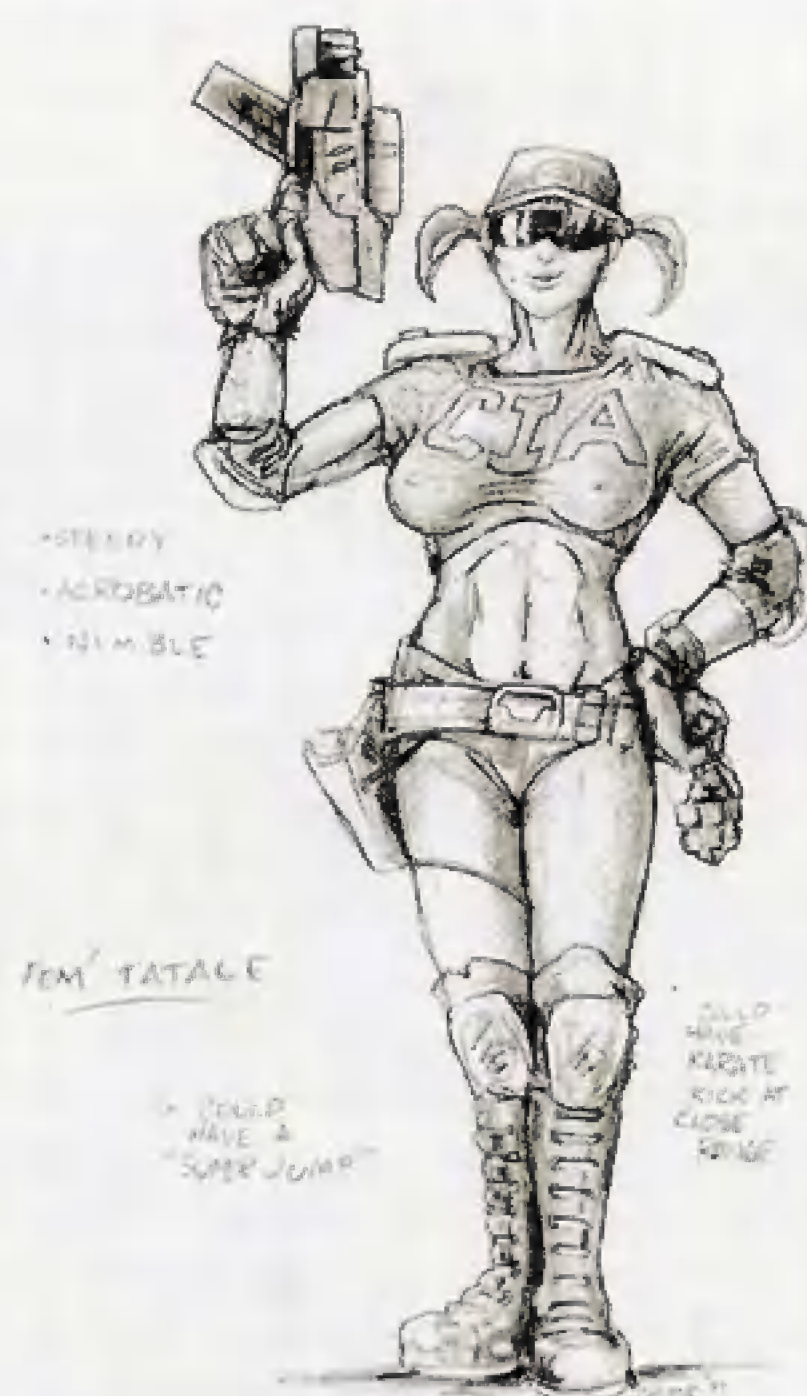
SPECIAL WEAPONS / CIA ASSASIN



SPECIAL ATTACK / PSYCHIC SOLDIER
CIA



LIGHT ATTACK / CIA SOLDIER



Half-Life Foes

Chuck Jones

Four early *Half-Life* enemies: The Assassin, Brainboy with a mind-gun, Butcher, and the Female Soldier

Houndeye



Demonstrates pack behavior, is non-aggressive singly, but in numbers is very aggressive

Houndeye
Ted Backman

Some creations required several iterations, while others were nearly complete on the first try. The Houndeye was one monster that went virtually unchanged from the first sketch.

"The Houndeye was one of the designs from *Half-Life* that came very easily. Its anatomy was inspired by a huge three-legged tabby cat named Tripod that lived in my neighborhood as a child."
- Ted Backman



Big Mama & Muddy

Ted Backman

Strong art direction and clear goals were there for both of these creatures from the start, but the AI proved to be very complicated due to their size and how different they were from “standard” game monsters.

“Big Mama (technically a Gonarch) is the final life phase of the lowly Headcrab. Few Headcrabs ever reach this stage, and little is known about how and when the metamorphosis takes place. This was a hotly contested design around the office during the development of *Half-Life*. I was nearly convinced that this was too graphic, but luckily the Gonarch found a champion in none other than Gabe himself.” - Ted Backman

“Sometimes we’re just sitting around and we’re tired and somebody comes up with a goofy idea like, ‘Why don’t we put a giant testicle on a 20-foot-tall armored spider?’ and Big Mama is born. Whereas alternatively, there are certain beasts we’ve created through gameplay instead of crazy ideas. A creature such as the Barnacle was created within the game universe as a way to constrict movement in dark areas. There’s no simple way to create monsters.”

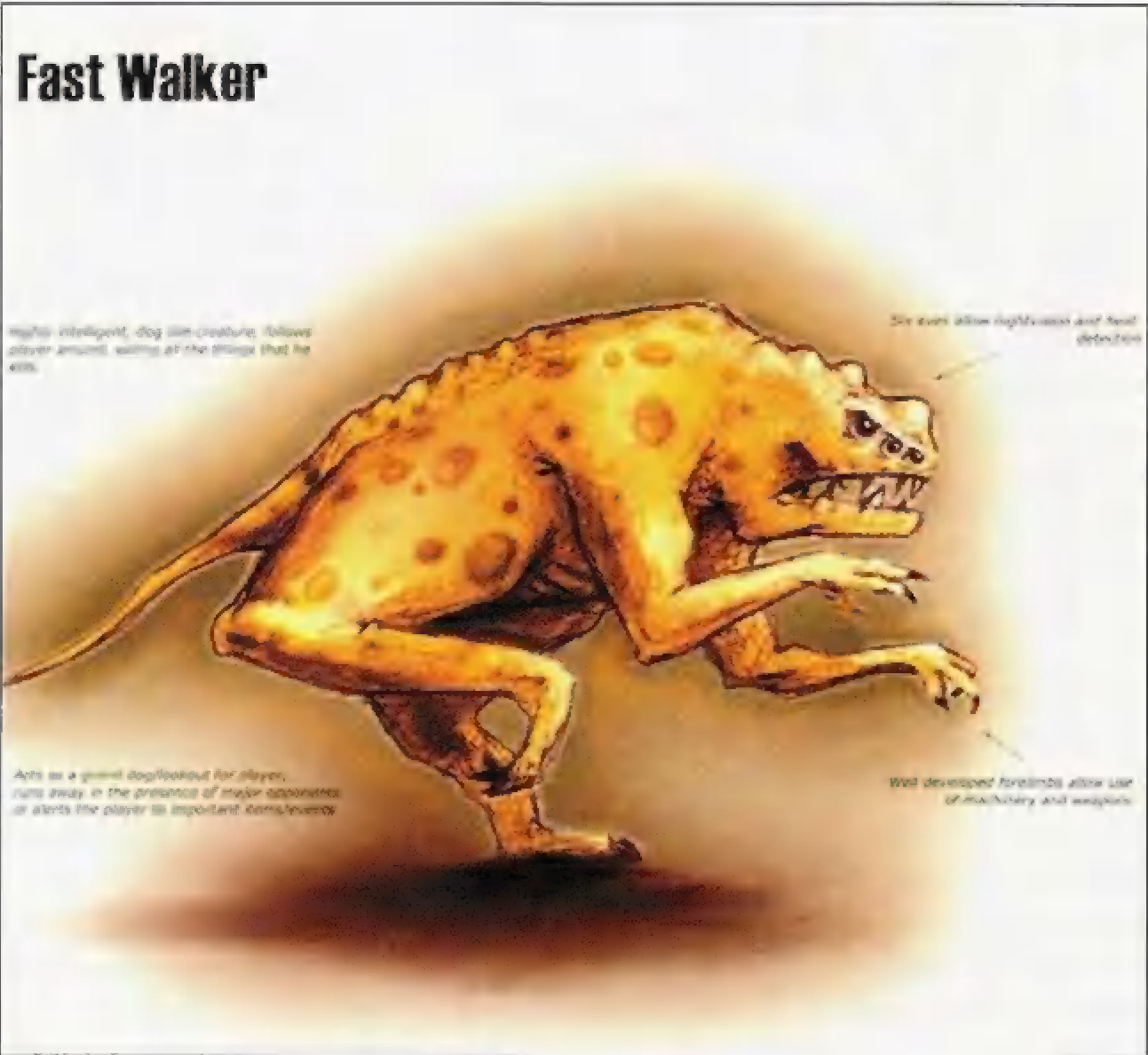
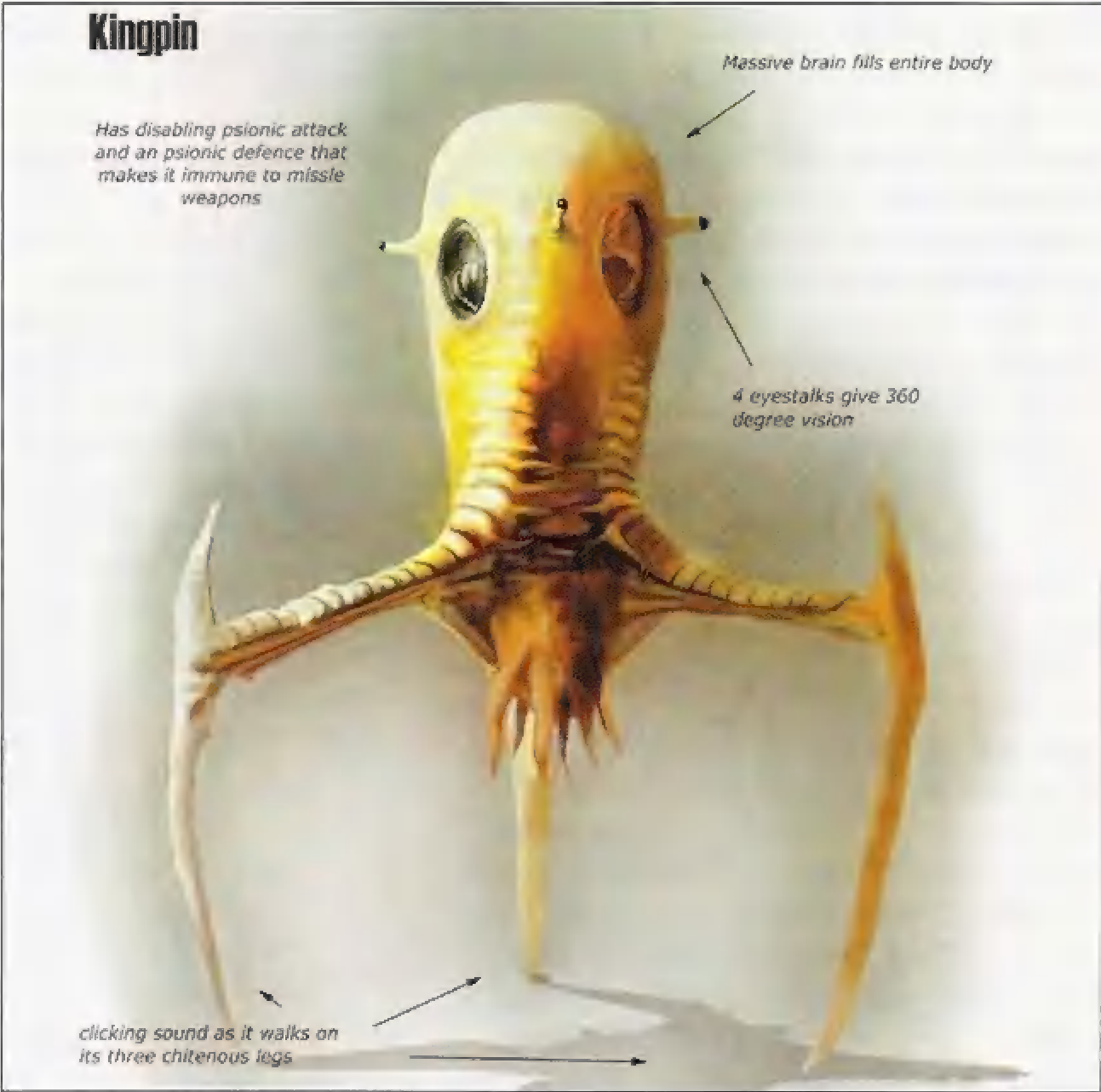
- Gabe Newell



Kingpin & Fast Walker
Ted Backman

Regardless of how compelling the character design seems, without convincing AI and clear gameplay goals, even the best of designs can get put away for a future title.

"We wanted the Fast Walker to be an ally, a creature who learned to love Gordon because of all the fresh meat Gordon would inadvertently provide through combat. This creature was to give Gordon clues about what was coming around the next corner, barking alarms." - Ted Backman



Mr. Friendly's Phallus

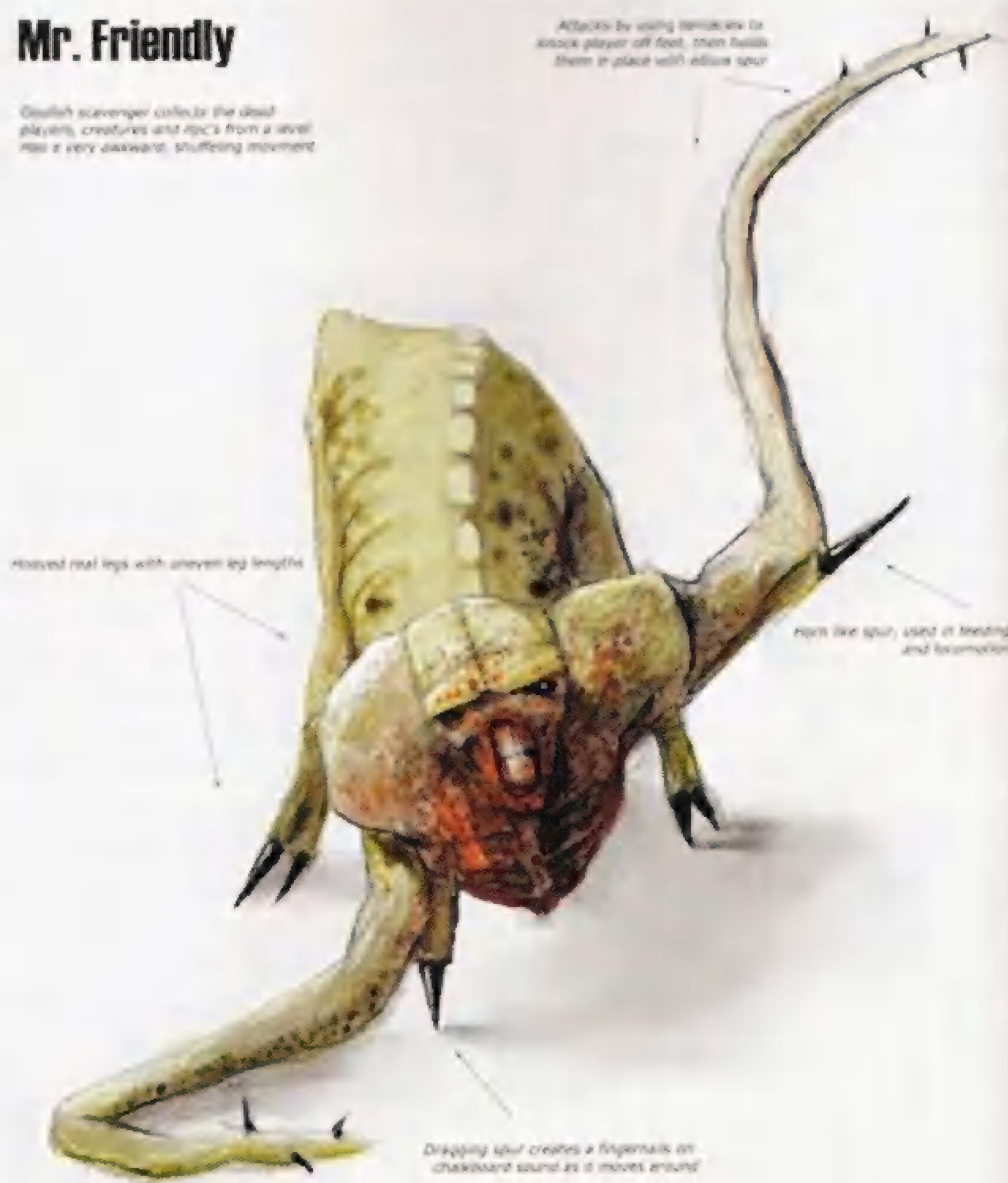
Ted Backman

One of Mr. Friendly's proposed attacks was to pound the ground and knock the player's weapon out of his hand. It was even suggested that Gordon's glasses fly off and leave the player stuck in combat with blurry vision.

"I remember early on when Gabe had worked out what genre he wanted to do and asked me to recommend a concept artist. I remembered my friend's little 12-year-old skater punk brother who used to draw. I had always liked his work, it was really nice classical stuff, and I heard he had just graduated from the University of Washington art department. So Gabe called him and asked him to do a couple of sketches of possible monsters. He came in, looking nothing like how I remembered him—he was no longer a little kid; he's now 6' 2", all tattooed up, with various metal bits poking out of his body. He then opens up his portfolio and starts showing drawings of these really disturbing and unsettling looking creatures, not at all what I was expecting. They looked liked deformed alien genitalia, except for this one that looked like a Cthulhuesque dog that had a fairly obvious phallus, and it looked like it was about to mount something. I'm thinking, 'Oh god, what have I done; this guy's a freak.' Then in a very straightforward way Gabe asks, 'So, ahh, what's this underneath the monster, Mr. Friendly?' There's a bit of pause, then Ted comes back with 'That's his penis.' There's a longer pause, then Gabe says, 'Uh huh.' I'm sitting there really starting to squirm but have no idea how to stop this train wreck. I'm just about to blurt out something and change the subject when Ted pipes up with, 'Well, I was thinking, what's scary to our target audience? A lot of them are 14-year-old boys, they've seen all the big brutish monsters with guns for hands already—that won't really do it—so I'm thinking what actual fears do they really have? So I decided to go with something that elicits a homophobic response.' He then starts into a long detailed talk about how Mr. Friendly lurches about in a permanent reptilian sexual display, grabbing the player with these long tentacled arms, and pulling them toward itself until the point of fatal copulation. After he finishes up, there's another long pause as Gabe continues to stare at the image. Gabe then looks up at Ted and says, 'Excellent, That's exactly what I was looking for.' He and Ted then get into this excited conversation about possible psycho-sexual alien behaviors and clinical descriptions of disturbed adolescent sexual fantasies and I sit back, sort of stunned, looking back and forth between the two of them thinking, 'Oh my god, what have I done.' From that point on, I didn't know where it was going to go, but I knew I didn't want to miss it. For me, that was the first day of Valve." - Ken Birdwell

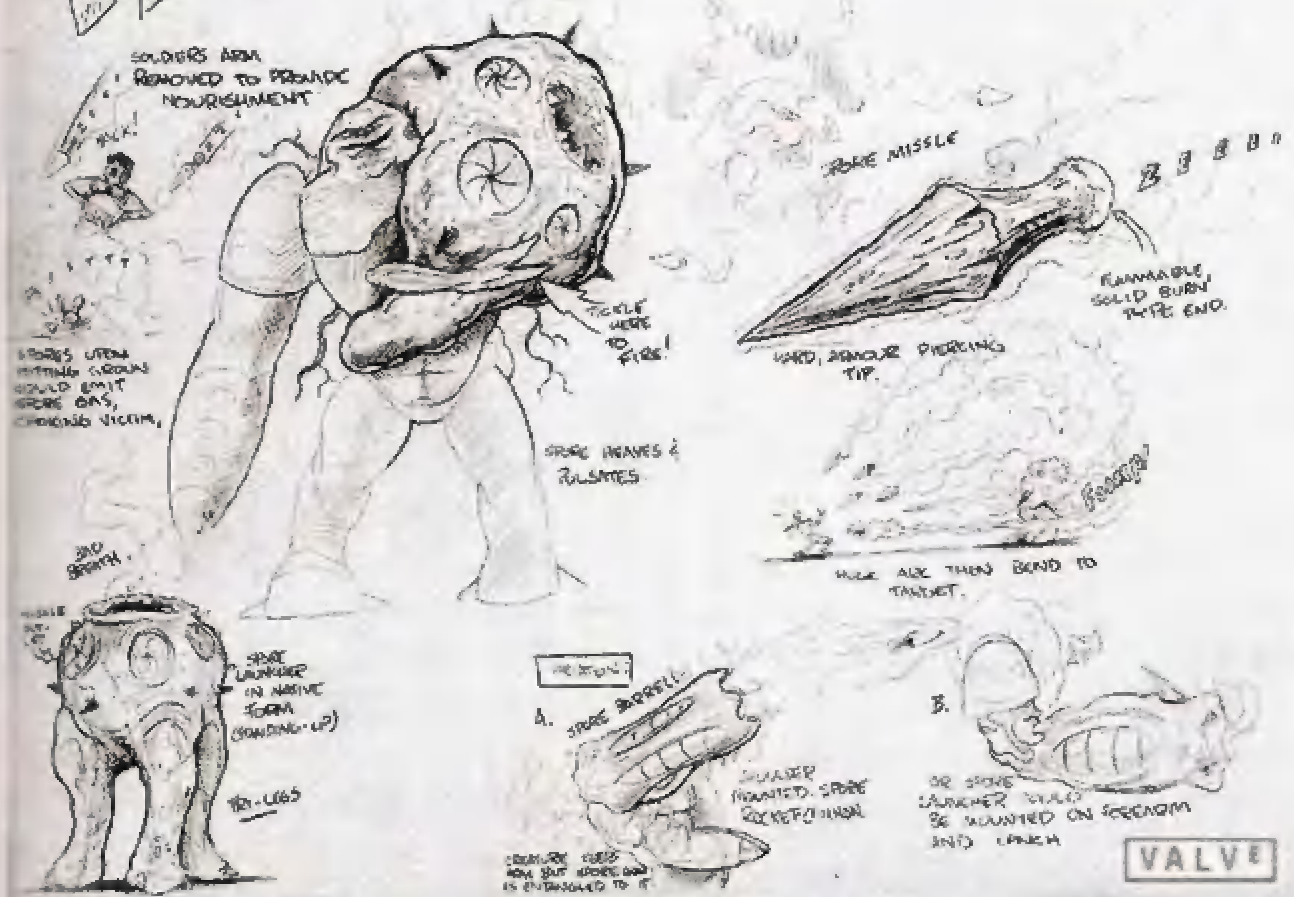
Mr. Friendly

Deadish scavenger collects the dead players, creatures and npc's from a level into a very awkward, shuffling movement



Panther
Eye
Chuck Jones

SPORE MISSILE LAUNCHER



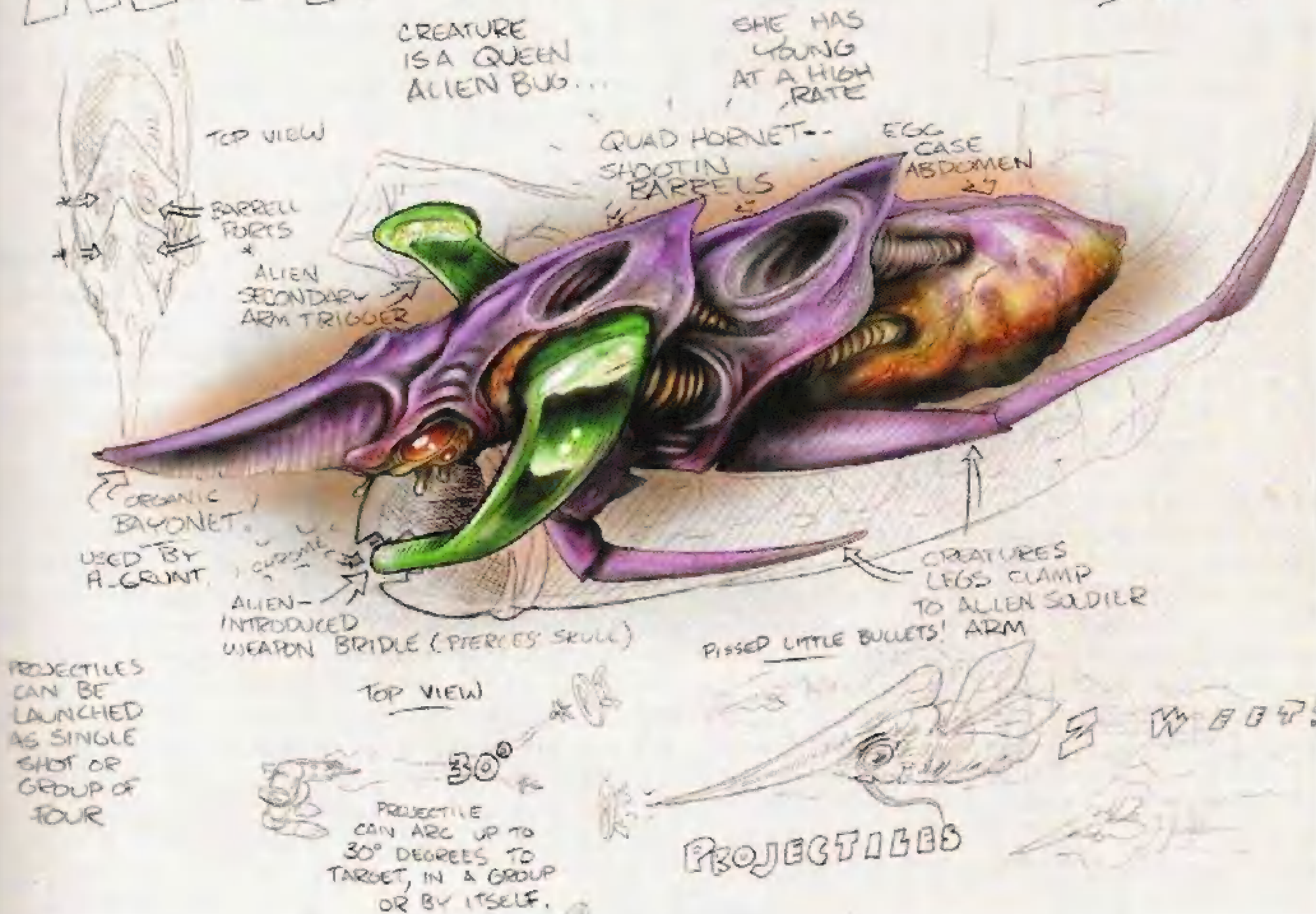
Spore Missile Launcher & Alien Organic Assault Rifle
Chuck Jones

Half-Life's unique arsenal features a combination of earthly and alien weaponry. The Alien Grunt's Hornet Gun is one of the first alien weapons to change hands in a game, and later became a staple of *Half-Life's* multiplayer component.

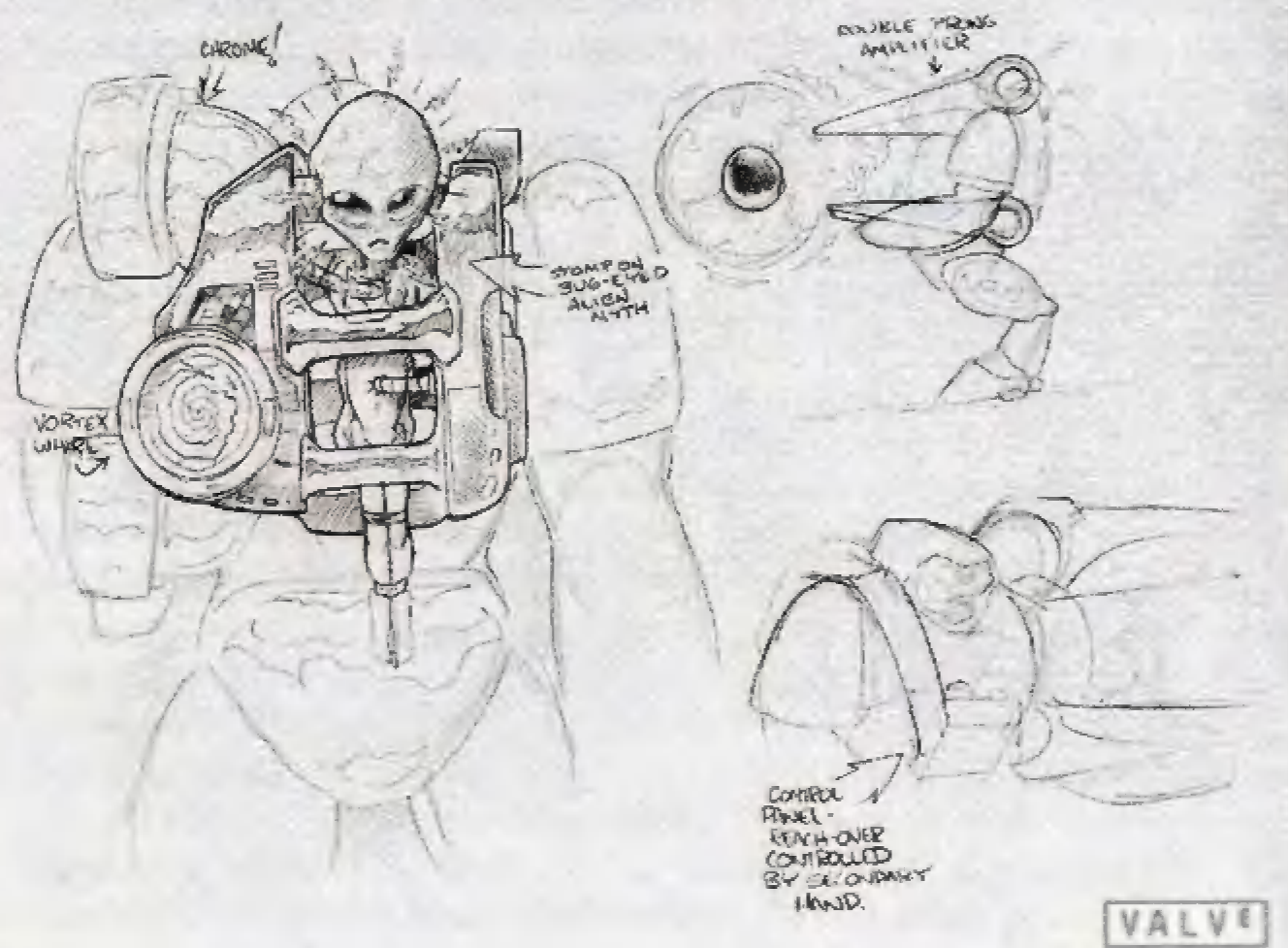


ALIEN ORGANIC ASSAULT RIFLE (HORNET GUN)

CHUCK



BLACK HOLE GUN



Alien Concepts

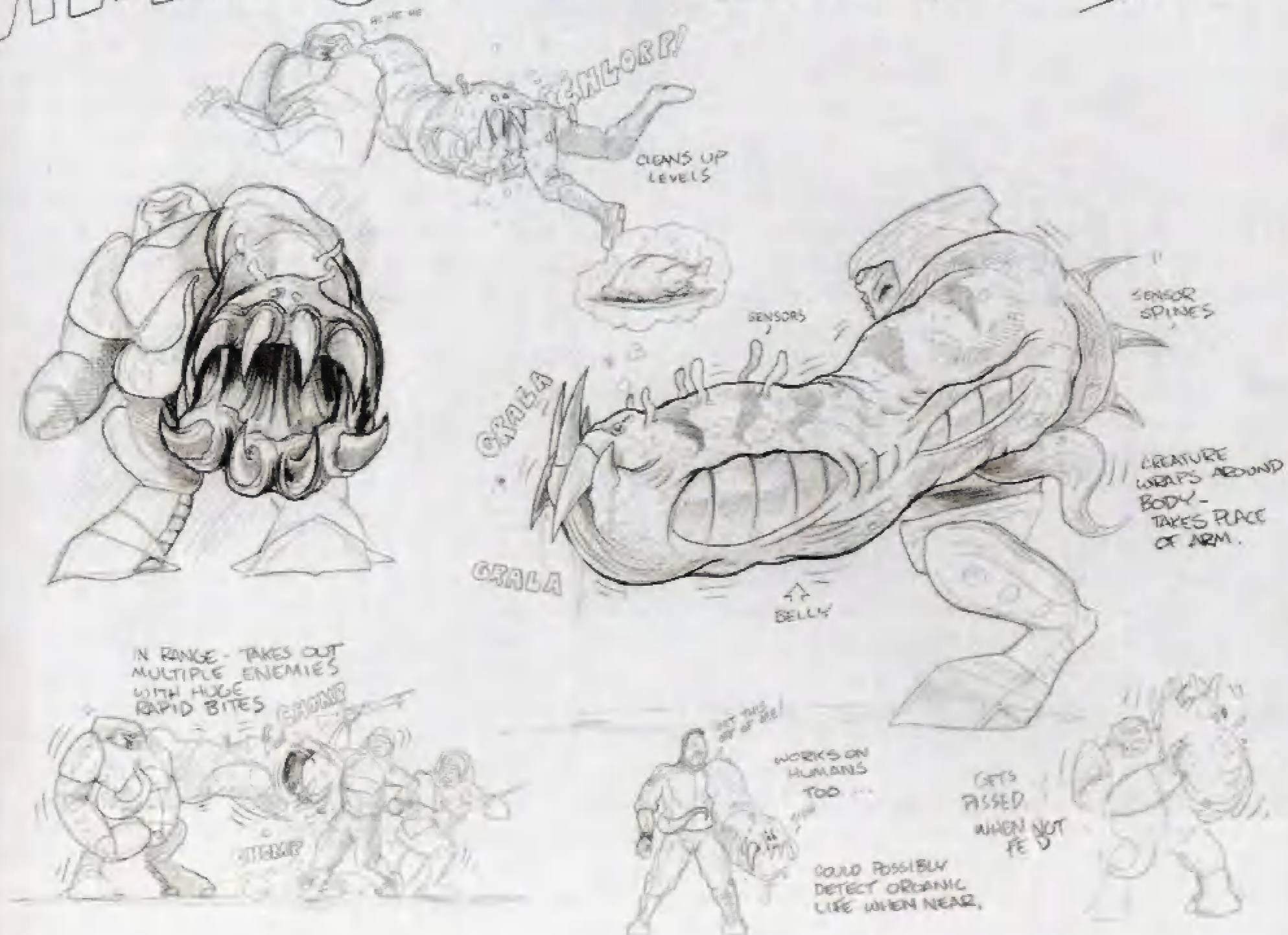
Chuck Jones & Ted Backman

Before it became *Half-Life*, "Quiver" went through a design phase where strange ideas and overt humor were emphasized. Eventually the team settled on a horror-action theme, with a few moments of dark humor to help balance the tension. Among some of the rejected suggestions ranged from a tentacle weapon severed from an enemy and deployed as a kind of slimy squirtgun, and a food fight in the Black Mesa cafeteria.



ALIEN ORGANIC CHAINSAW

CHUCK



Alien Organic Chainsaw

Chuck Jones

An early sketch of the Alien Organic Chainsaw. This creature would later become the Alien Grunt, shooting heat-seeking "thornets."



Alien Slave

Chuck Jones

Early story designs for the Alien Slave had Gordon Freeman winning them over as allies in the Xen sections of *Half-Life*, and leading them in outright rebellion. This plan proved impractical, but the idea of befriending the creatures bore fruit in *Half-Life 2*.



Alien Concepts Ted Backman

Unused concepts from *Half-Life*: a demonic bipedal monster and the second version of the Kingpin



Flocking Floater



Flocking Floater

Ted Backman

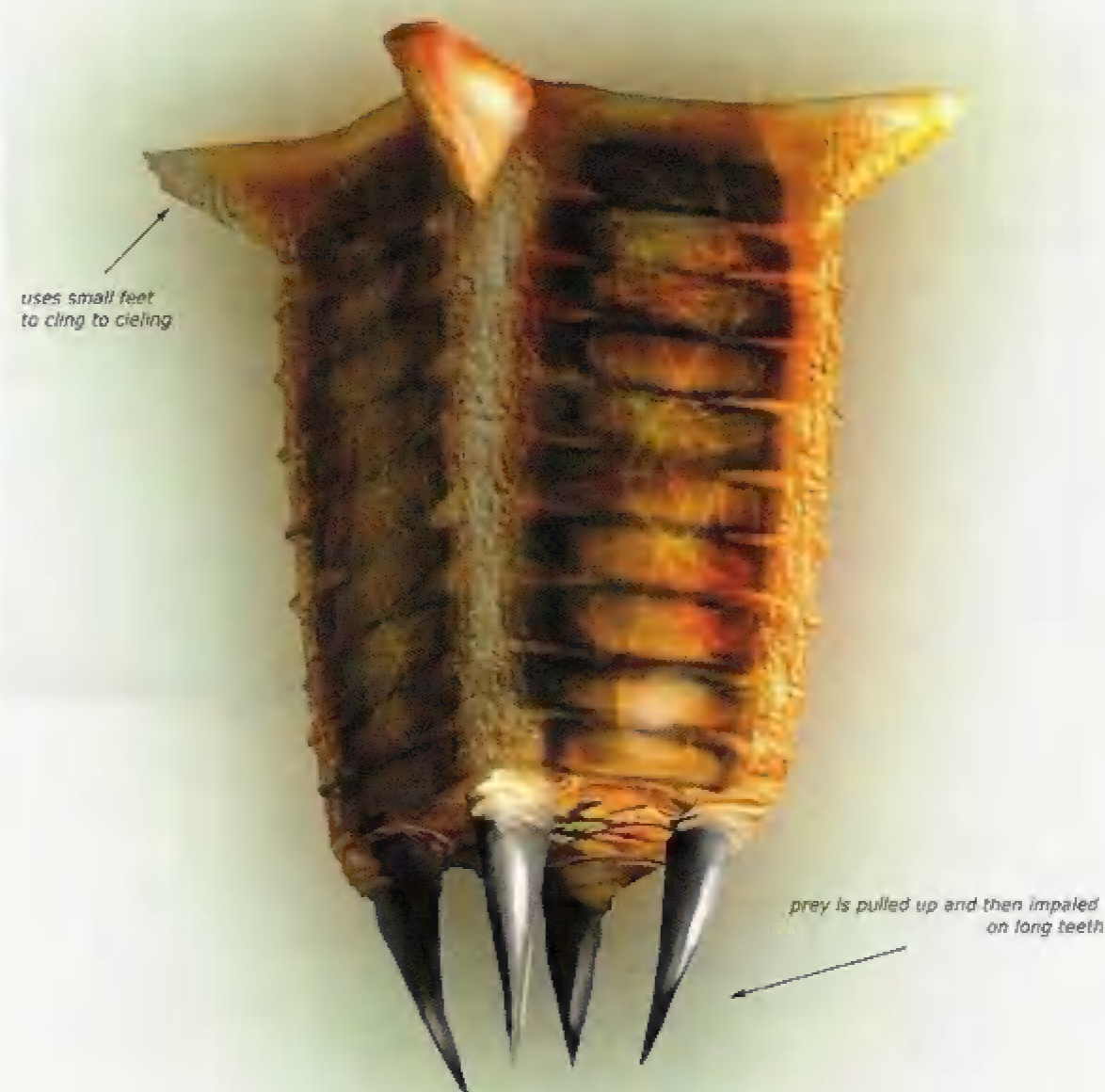
This creature was a living balloon, held aloft by buoyant gases trapped in its head membrane. The fin on the rear portion of the monster was fully articulated like a bat wing, tipped with poisonous spines. Flocking Floaters had feathery antennae, much like a moth, as their only sensory organ.

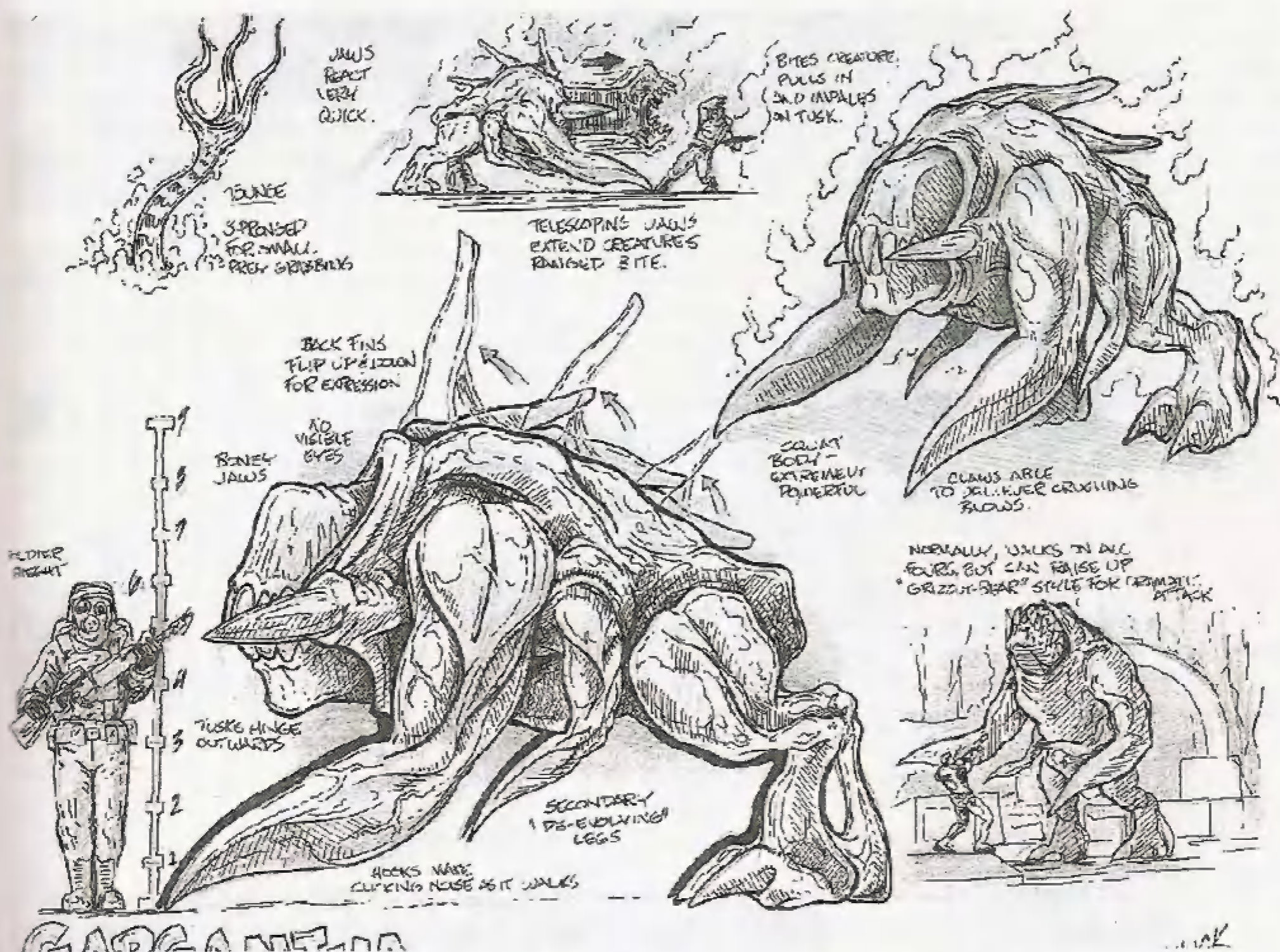
Barnacle

Ted Backman

Known for its unforgiving grip, the Barnacle is one of the many creatures that survived the early days of *Half-Life* and still continues to thrive in City 17.

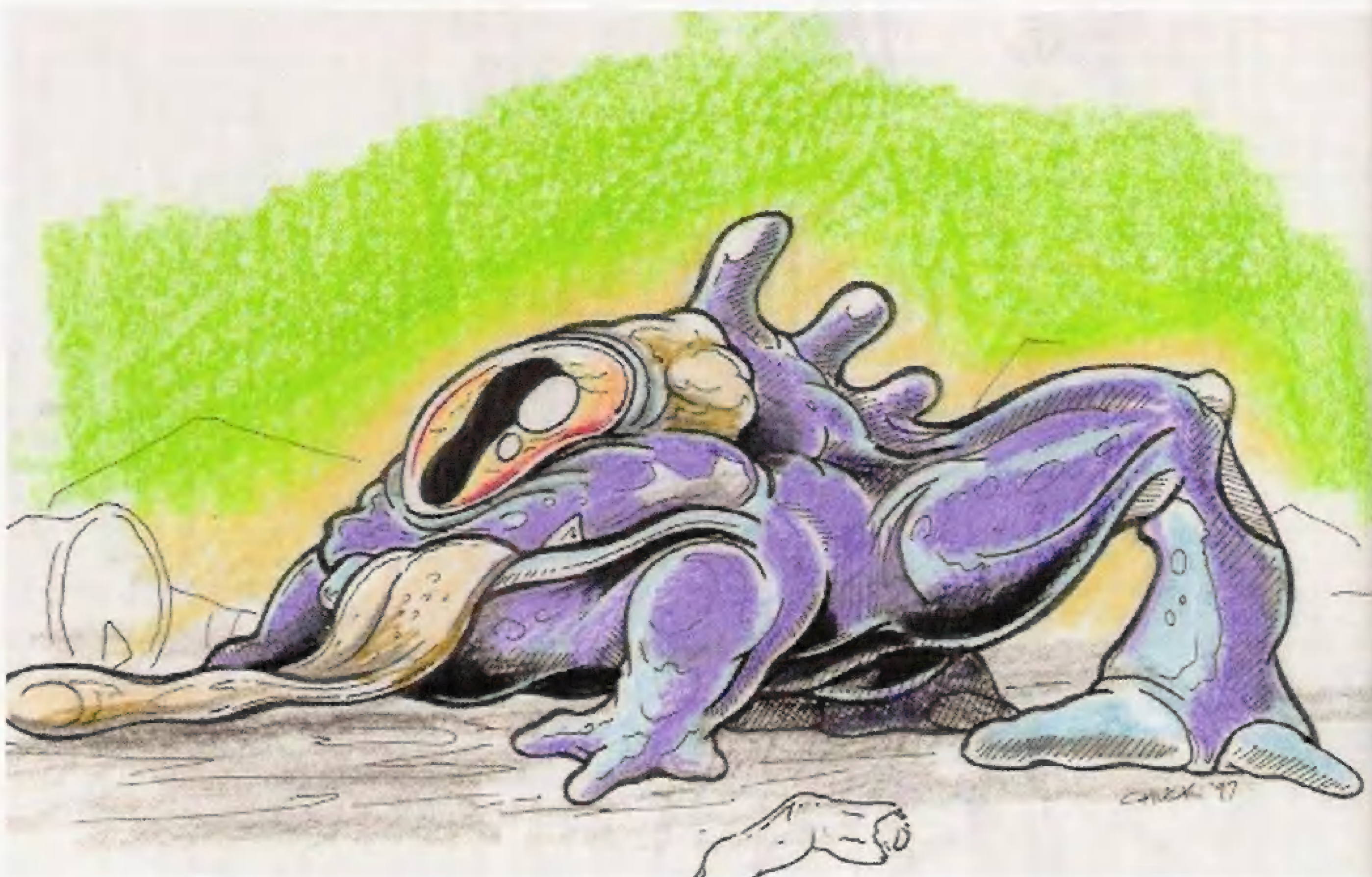
"The Barnacle is *Half-Life*'s essential sucker-punch or cheap-shot monster. You can see them coming from a mile off. They are completely inert and easily avoided. This makes it infinitely more humiliating when they grab you and bite off your head." - Dave Riller





Gargantua
Chuck Jones

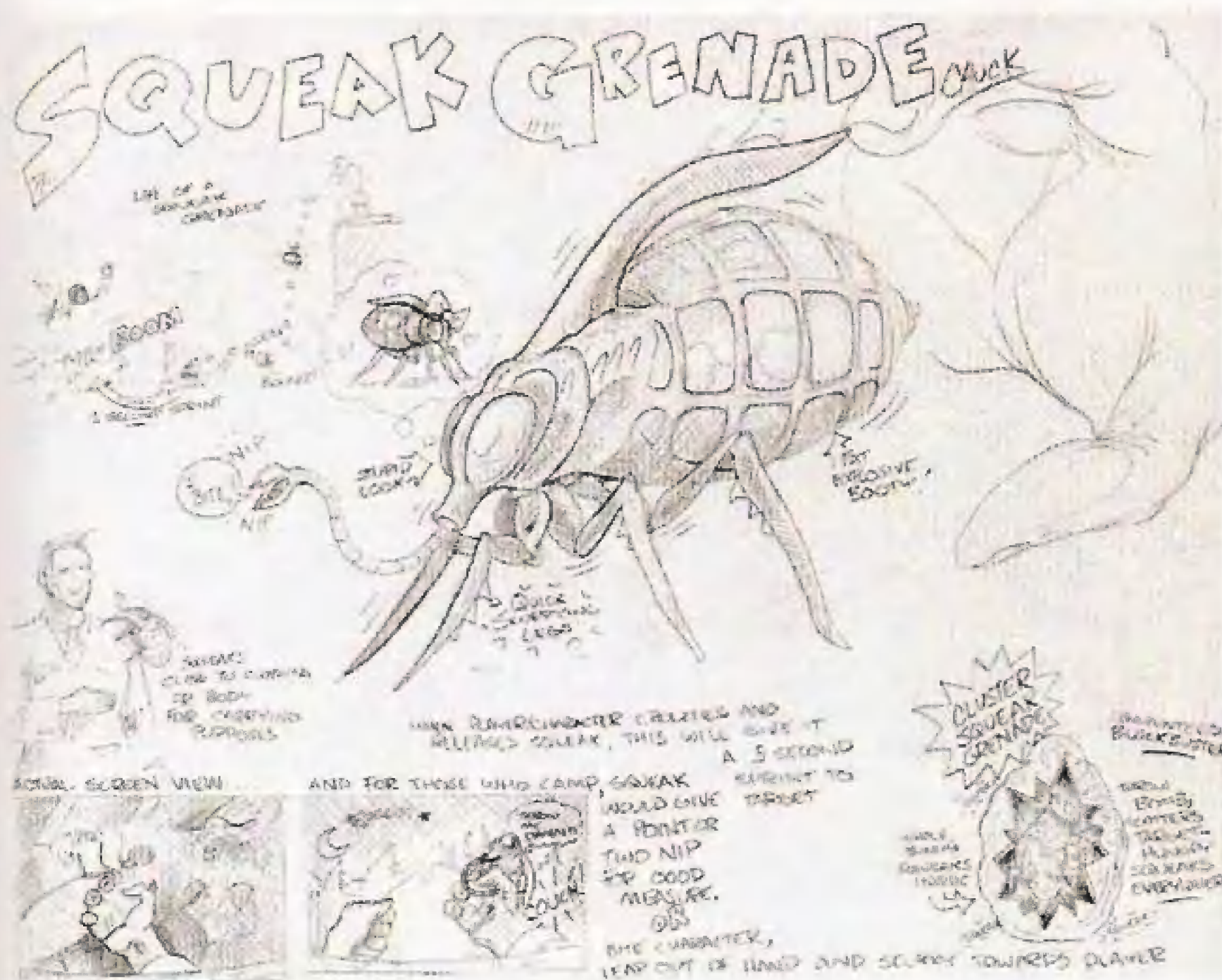
This large creature was an amalgamation of two designs, both stemming from the earliest sketches.



Chumtoad
Chuck Jones

The Chumtoad was meant to be the favorite food of many Xen monsters. Team members wanted to test the idea of the player using a Chumtoad as bait to lure a Bullsquid from its den, or distracting it when it was attacking them. The bait gameplay was never developed, but before the creature was cut from the game, it cycled through a number of names: from Chubtoad to Chumtoad to the truly unfortunate appellation, Choad. Though the Chumtoad was cut from *Half-Life*, it remains a mod community favorite.





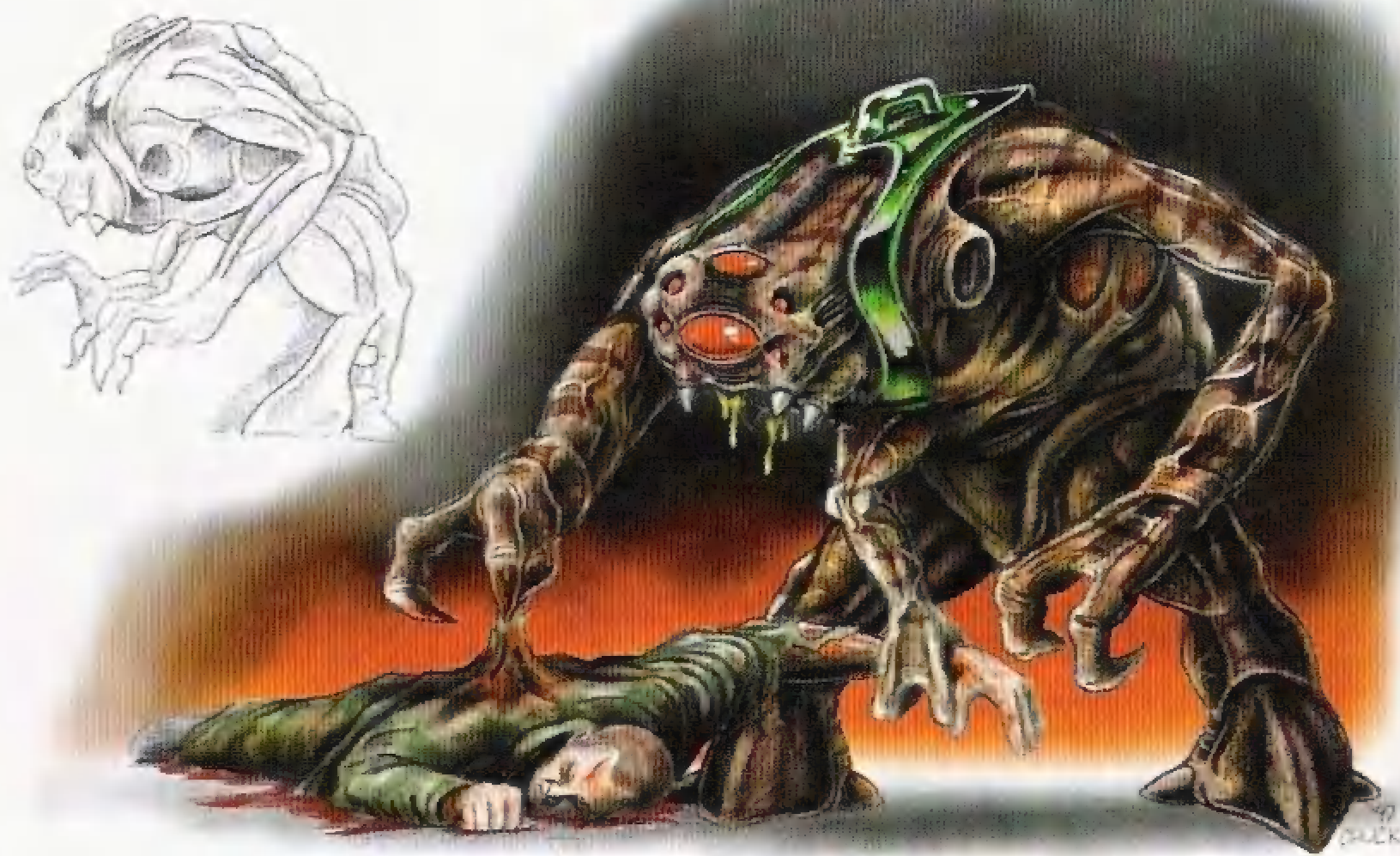
Snark
Chuck Jones

The Squeak Grenade was eventually given the Lewis Carrollian nickname, "Snark." It was a creature that evoked both fear and laughter in its victims. The sight of a player running from a swarm of chittering, exploding Snarks was typical of a *Half-Life* deathmatch.



Alien Slave aka Vortigaunt





VALVE

Alien Slave

Chuck Jones & Dhabih Eng

The Alien Slave (dubbed Vortigaunt when it came time to put together a *Half-Life* strategy guide) would return in *Half-Life 2* as an ally working with the resistance.





CHUCK '97

VALVE

Alien Grunt
Chuck Jones

The Alien Grunt was conceived as huge, powerful, and relentless. It was not realized until fairly late in *Half-Life*'s development exactly how huge it would be. Many of the areas where the player battled the grunts had to be redesigned, with walkways widened substantially in order to allow the Alien Grunt to travel comfortably without getting stuck. Valve designers learned that creature design and level design must be coordinated at every stage of game development.



It was designed to be powerful, like the dog
because it looks like the dog and has the same

Coloring would be brownish with some reds
pink and to make it look like a dog and not like
a cat or a fox.

Large teeth, making it look like a dog and not like

Elaborate details

Black, multi-colored eyes

Ground approach

Bullsquid

Ted Backman

The Bullsquid, originally dubbed "The Bulchicken," made it from concept sketch to the final game with virtually no changes other than its name.



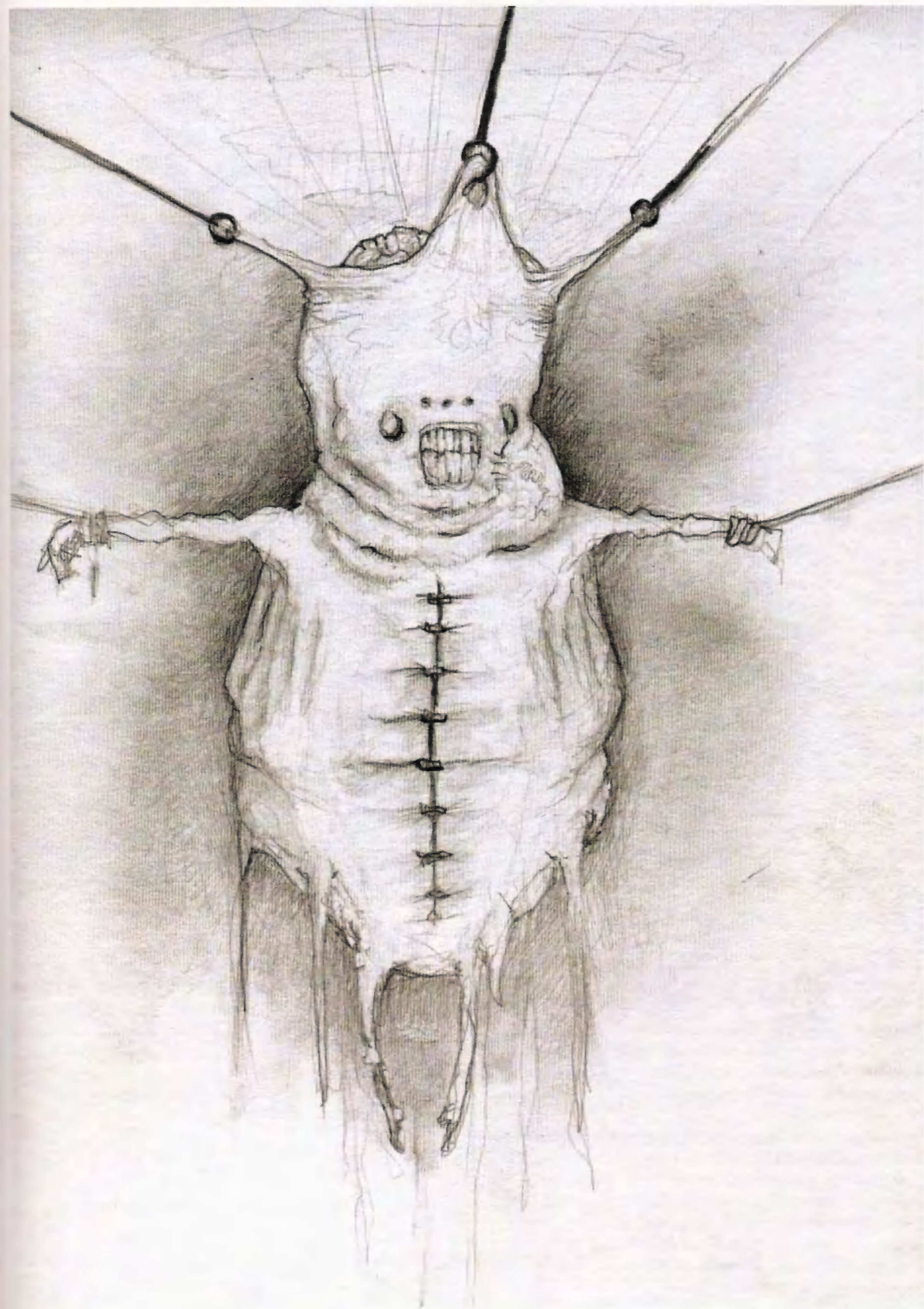
Zombie



Nihilanth

Ted Backman

An early version of *Half-Life*'s final boss. The name Nihilanth is meant to suggest not only Nihilism, but also "anth," meaning "flower," due to the way its head opens up like petals.



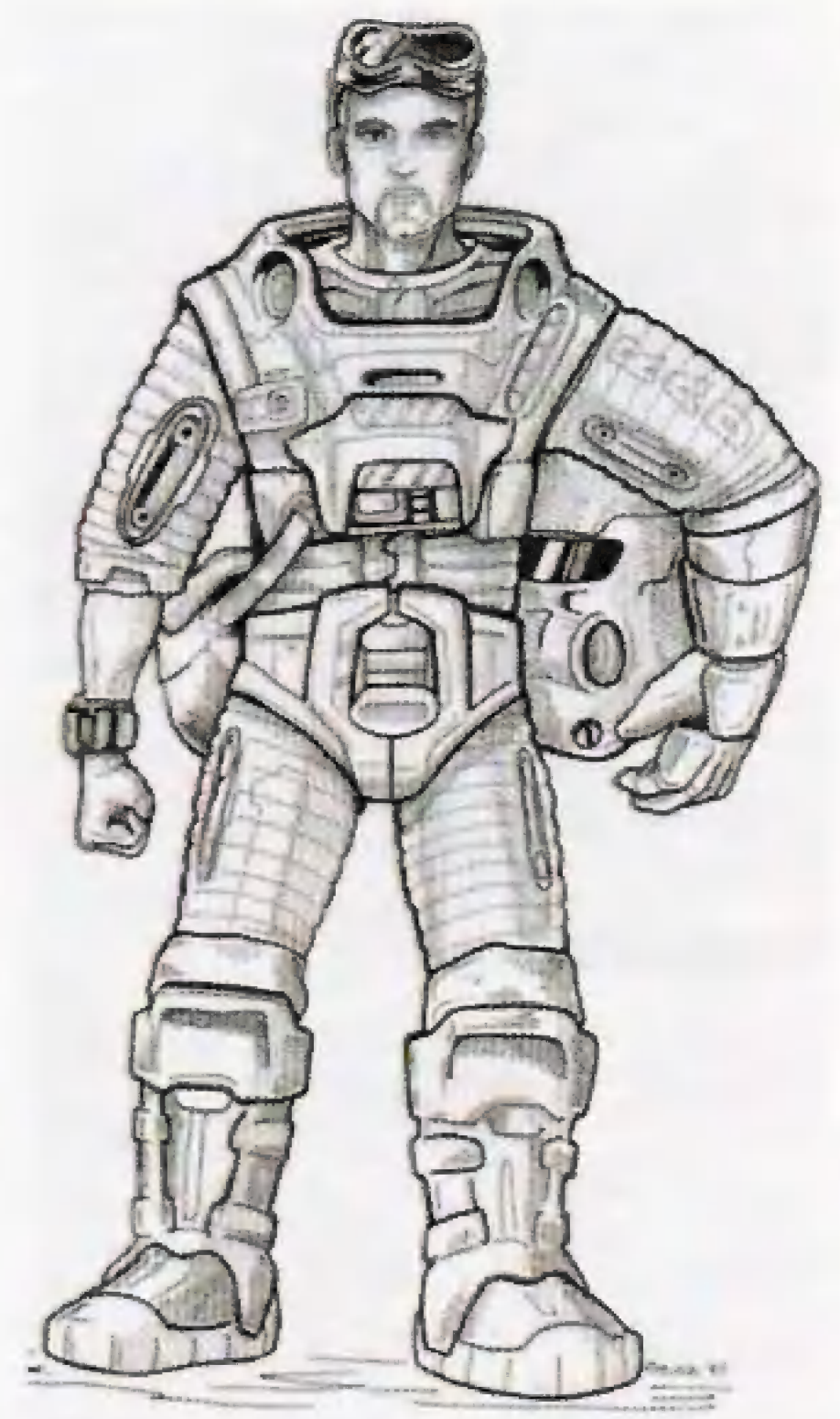


Gordon Freeman

Chuck Jones & Dhabih Eng

This is an early model for the viewpoint scientist character (above), affectionately known as Ivan the Space Biker. Gordon's beard eventually turned into a stylish goatee, while his glasses also went through several versions. For a time, he even sported a ponytail.

"We went round and round on names for the character. I thought it should evoke some famous scientist, so I took the name of one of my heroes, physicist/philosopher, Freeman Dyson, and smushed his name together with that of the French mathematician, Jules Henri Poincare. I proudly blurted out Dyson Poincare. Gabe immediately countered with the far more reasonable Gordon Freeman, and that was that. Like many important game design discussions in those days, this all happened at lunchtime, in Gabe's car, en route to our favorite Japanese restaurant." - Marc Laidlaw



"When choosing a name for the game, we tried to establish criteria: it needed to be evocative of the theme, avoid clichés in the genre, and have a corresponding visual mark. We brainstormed some ideas, and then picked *Half-Life*. We wanted to communicate the science fiction feel, the more mature sense that we were going after a game that was not just a shooting gallery. There was going to be a richer experience and a more thought-provoking one...and so *Half-Life*. We thought about that, and that seemed cool, and we tried to look at Half-Dead. We went through hundreds of different names, *Half-Life* was one that stuck out fairly quickly." - Gabe Newell



Infantry grunt



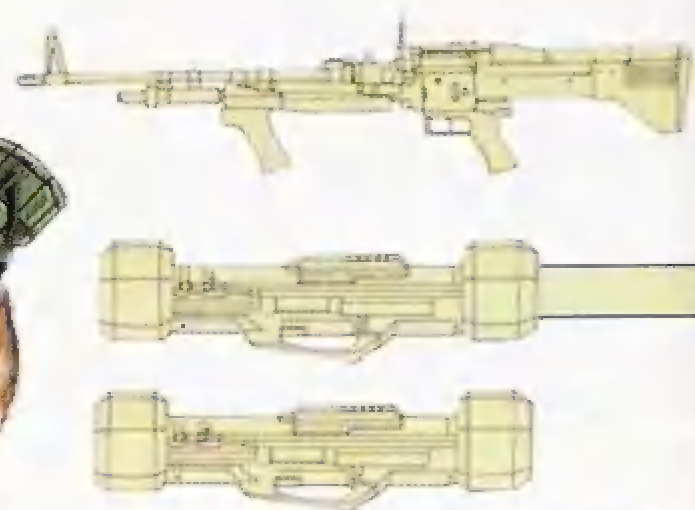
Infantry grunt

Soldiers

Chuck Jones

Even with their award winning AI, at some level the soldiers job in the *Half-Life* universe was to look busy, menace the player, and die in interesting ways. Wearing a clever form of anti-camo, these soldiers were designed to give both the impression of being camouflaged, but at the same time be highly visible on low-resolution displays.

"The soldier AI was designed to have a few tactical responses to things that the player did, so the combat experiences were exciting and different for various styles of play. Designing the soldiers to react to the player's choices allowed each player to develop skills and tactics to succeed within their own style. I think we knew we were on the right track when the soldier AI started doing things that even surprised me." - Steve Bond



Human Sargeant

- Spray attack with M16
- Two rocket attacks with LAW launchers
- Had a melee attack at close range
- Smokes a cigar
- Flat-top & bad attitude
- Commands squads of grunts & is in radio contact with command.



2003

~~Black~~Black Butte ~~Base~~ Missile Base

B.B. Montana

Silo One

~~March 31, 2003~~

4:33 p.m.

Sand Basin

Diablo Plains

Fertile Plains

Black Mesa, NM

Mesa Diablo, New Mexico

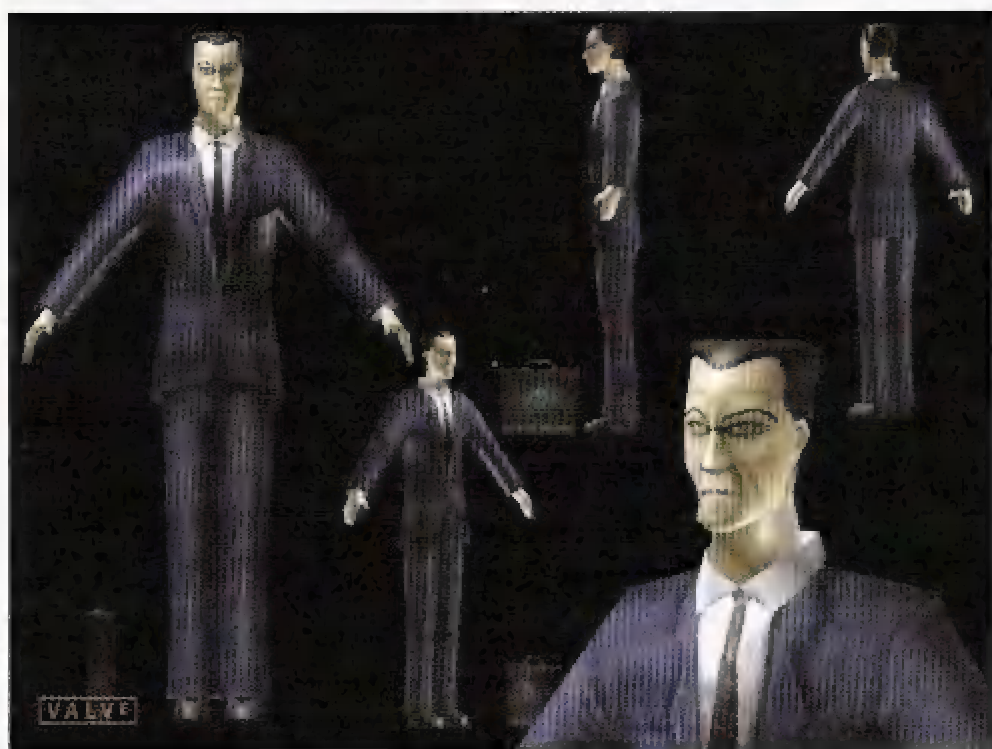
Diablo Mesa

Black Mesa

Science fiction author Marc Laidlaw joined Valve in the summer of 1997. Presented are Marc's brainstorming notes on the name of the research facility eventually dubbed, "Black Mesa."

"It's great fun to invent names for our creations, and then see them go out into the world and take on lives of their own. But I am very glad that I decided to go with 'Black Mesa Research Facility' rather than 'Black Butte.'"

- Marc Laidlaw

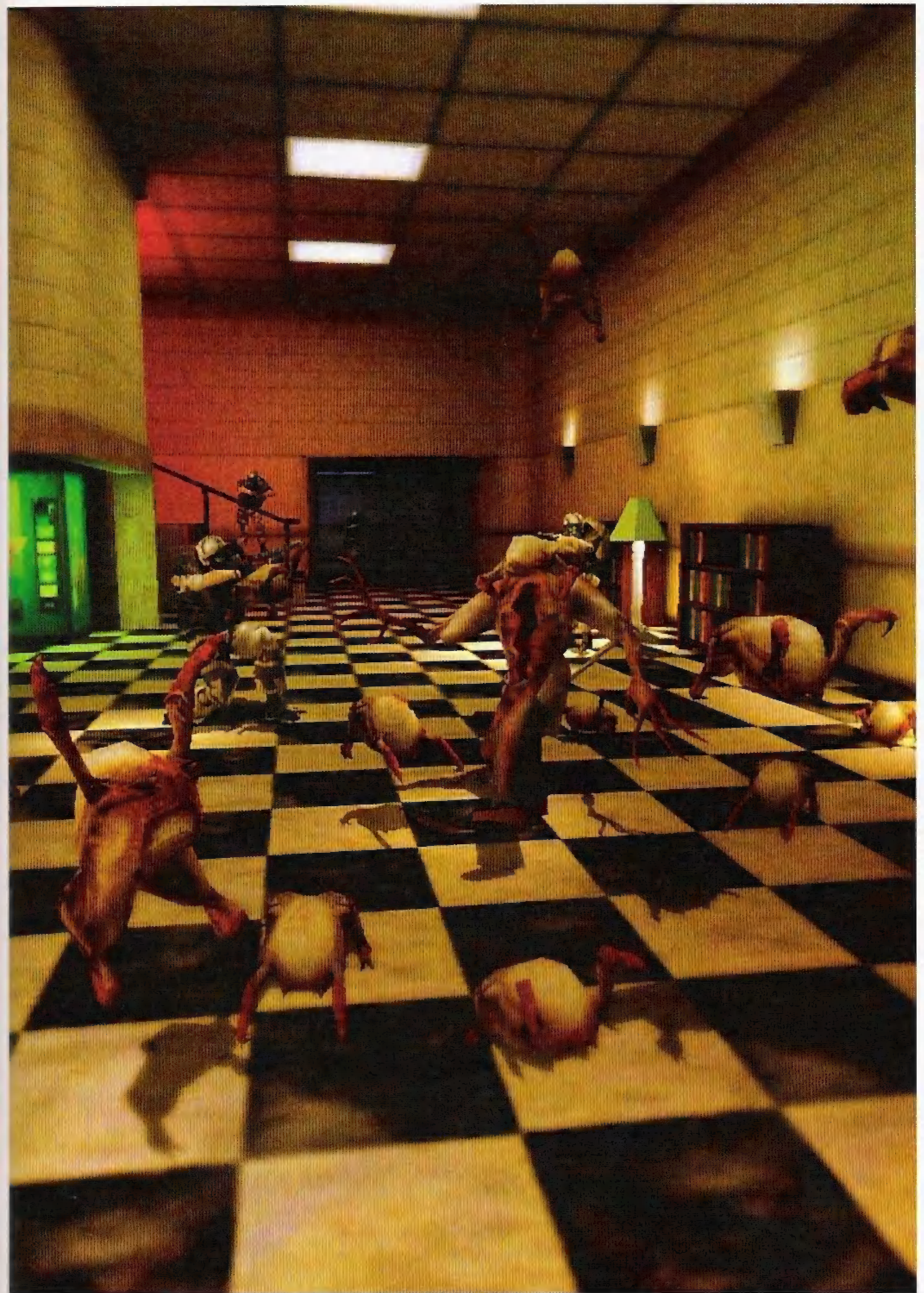


Barney, Scientist, & G-Man

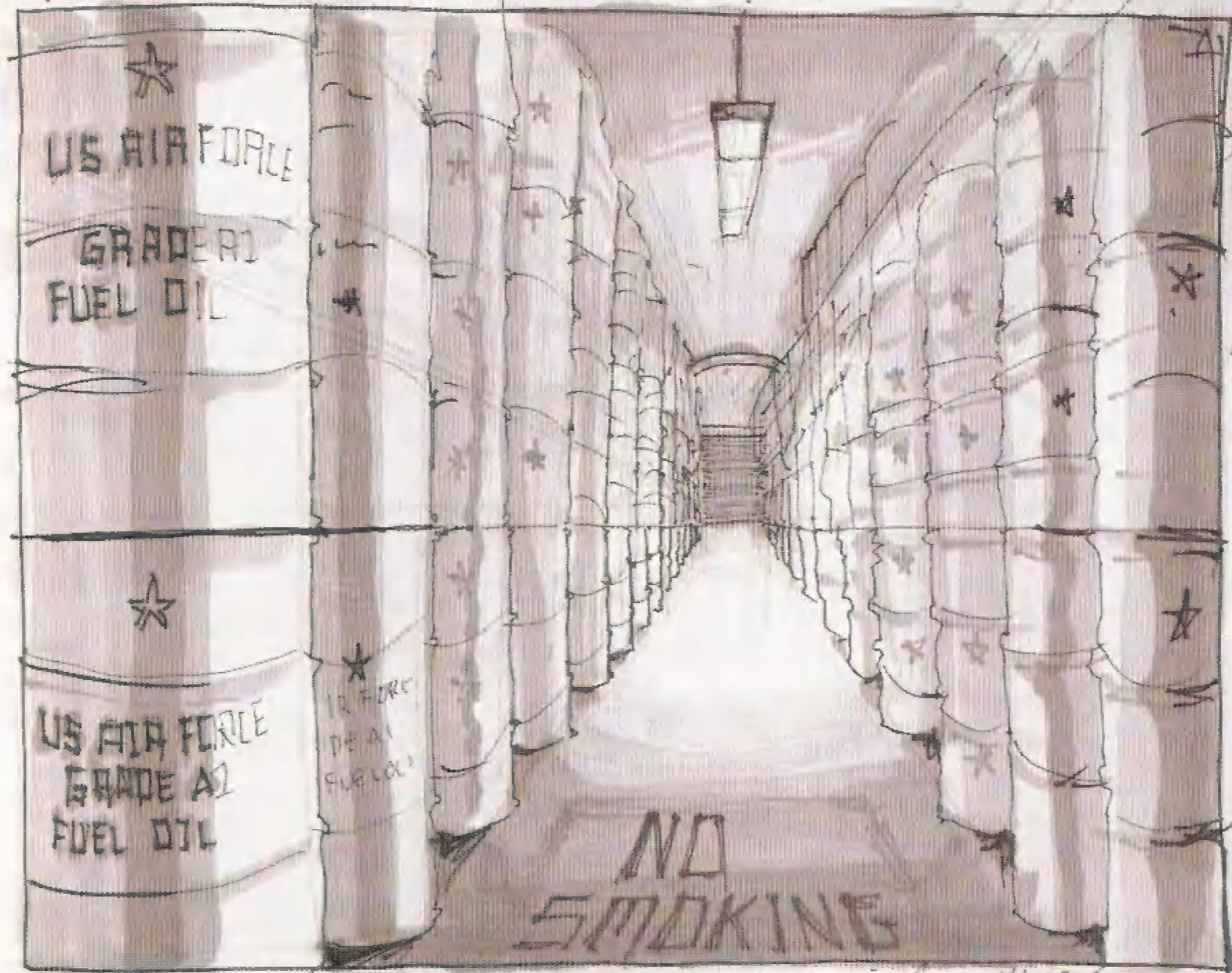
Chuck Jones

Initially conceived as a somewhat ineffectual bad guy, Barney was used by AI programmer Steve Bond to run experiments in enemy squad behavior. By putting the player in the role of squad leader, and forcing Barney to follow instead of fight the player, Bond hoped for an easy way to test navigation rules. The unexpected result of this experiment was a working companion character, which instantly appealed to everyone who saw Barney in action. This caused Valve to rethink large portions of the story, and recast Gordon's role in the world, as the game went into a complete overhaul beginning in late 1997.

In early prototypes, all characters in the game had an adversarial relationship with the player. There was no assumption that friendly allies were possible, let alone desirable. When the first active allies showed their usefulness, the designers began to cast around for characters who were neither allies nor outright enemies, but existed mainly to create a sense of intrigue. This precise design goal gave birth to the mysterious briefcase-carrying G-Man. While the codename "G-Man" slipped into common use, it remains merely a codename. The actual name of this character is still open to speculation.

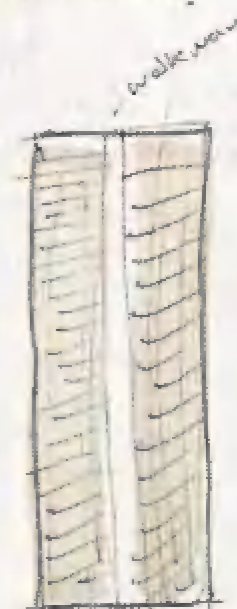


FUEL STORAGE AREA - FLOOR B - MISSION 1, EP. 1



LARGE CYLINDRICAL HALL STACKED WITH BARRELS OF OIL -

POSSIBLE GAME-PLAY ISSUE - AN ENCOUNTER HERE WOULD FORCE HAND TO HAND / MELEE COMBAT USE OF GUNS COULD CAUSE PROBLEMS!



Must walk single file down path - creature moves in from other end when player reaches halfway.

TOP

Black Mesa

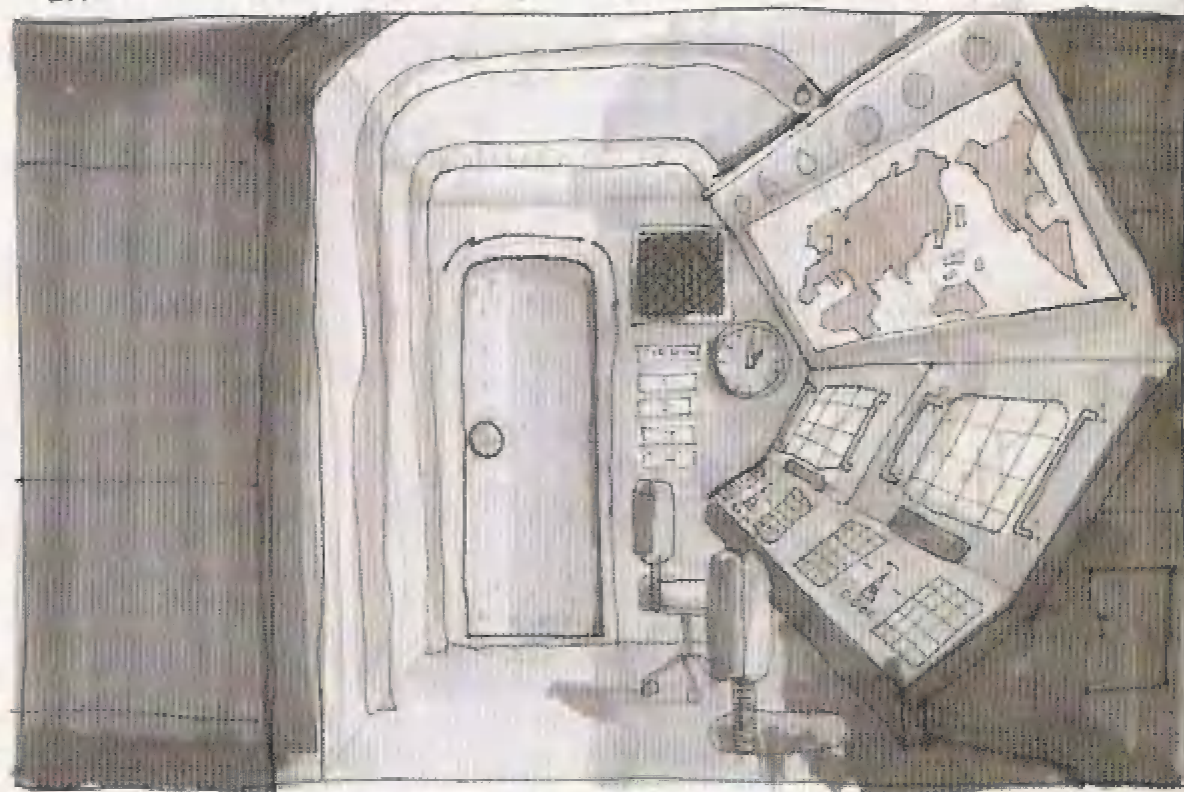
Ted Backman

The team created a variety of environments during their second week. Clockwise from the top left: a fuel depot, a morgue, a high-security checkpoint, and a launch room.

"Final editing of *Half-Life* maps was something we had to do ridiculously quickly; the time from when we'd finish a design idea and playtest, to the next iteration was often a matter of a few hours. We were under a strict delivery deadline, and I don't think any of us had finalized software and gameplay features at such a pace before. Several of us spent most of our waking hours, for over six months, packed into a single office we not-so-affectionately referred to as 'the submarine.' For most of us in the room, it was our first time shipping a game. We pulled an indecent number of 16 hour days, and it was one of the most fun and rewarding experiences I've had at Valve."

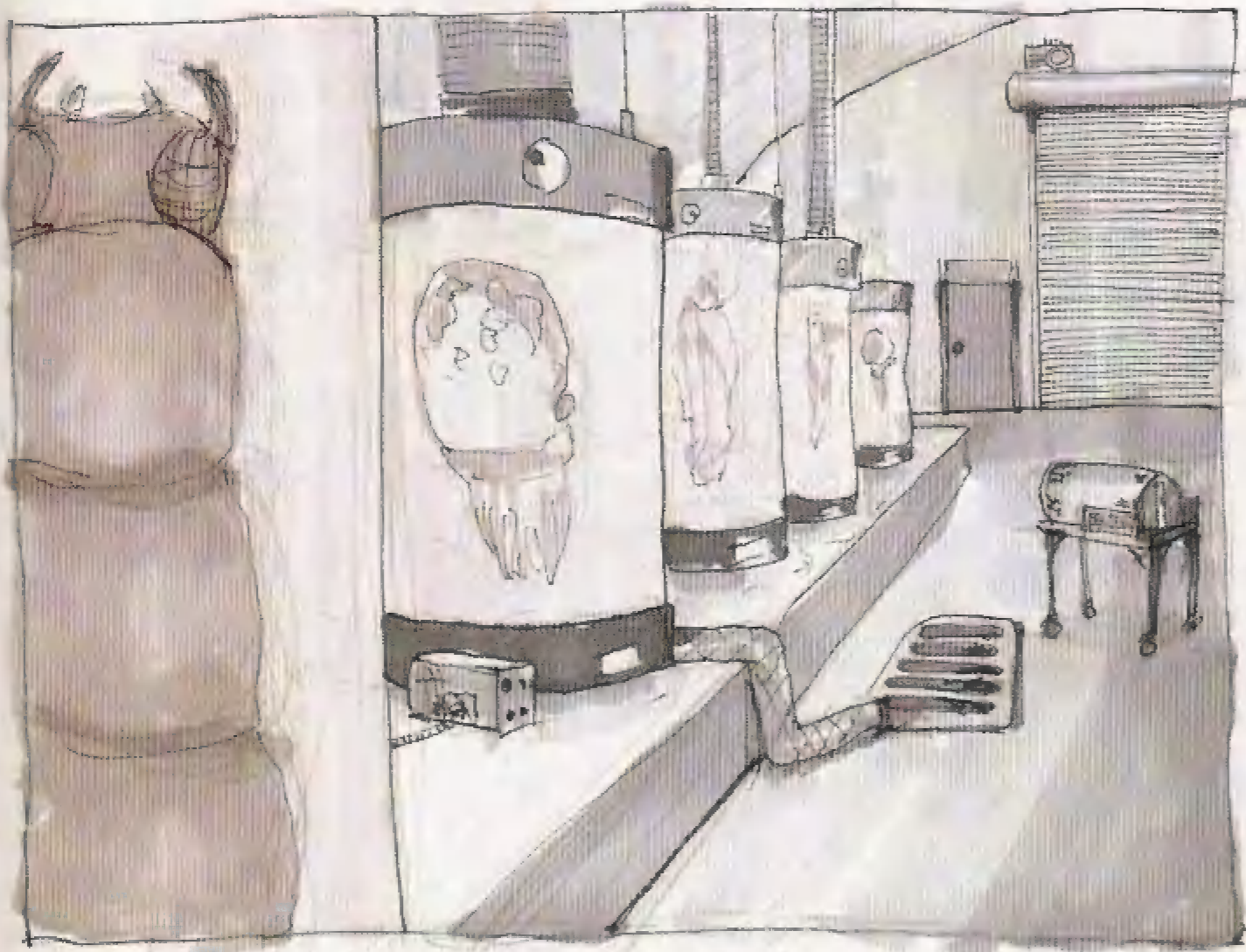
- Kelly Bailey

LAUNCH KEY ROOM (PUZZLE #2) FLOOR B (BATHROOM ADJACENT)



Displays illuminate otherwise darkened area. Lots of wires here.

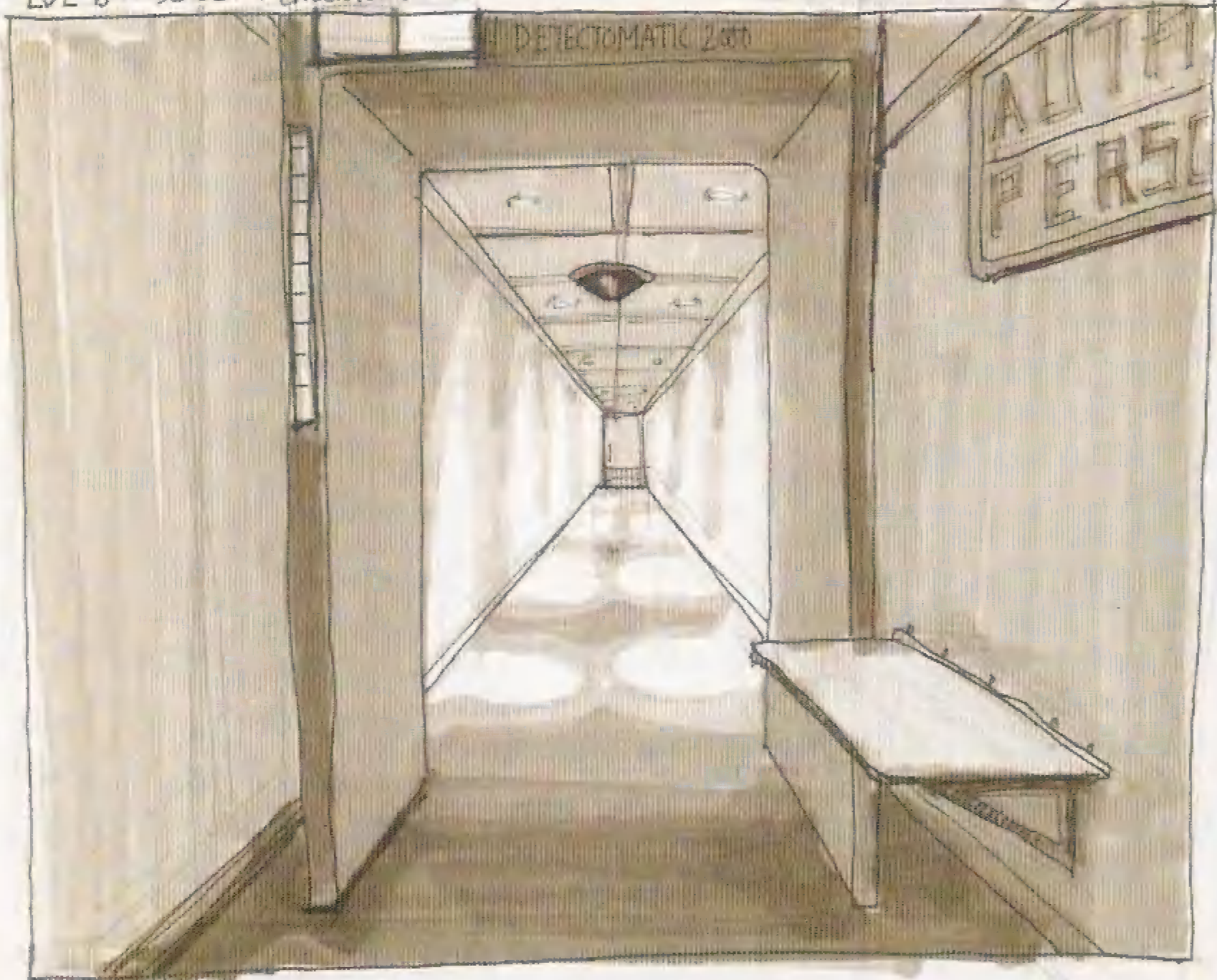
Here is where you'd probably need to turn keys to open the top of Silo #1 to gain access to RR



SPECIMAN TANKS - LOWER LEVEL ROOM ADJACENT TO 'LAB'

COLD WAR ERA ARCHITECT

LVL B - SECURITY CHECKPOINT



WAV FILE ASSOCIATED W/ METAL DETECTOR - ALWAYS GOES OFF WHEN GOING THRU. - - NORMAL LIGHTING OUT-EMER. LIGHTS ON
Black dome camera housings found throughout level B -

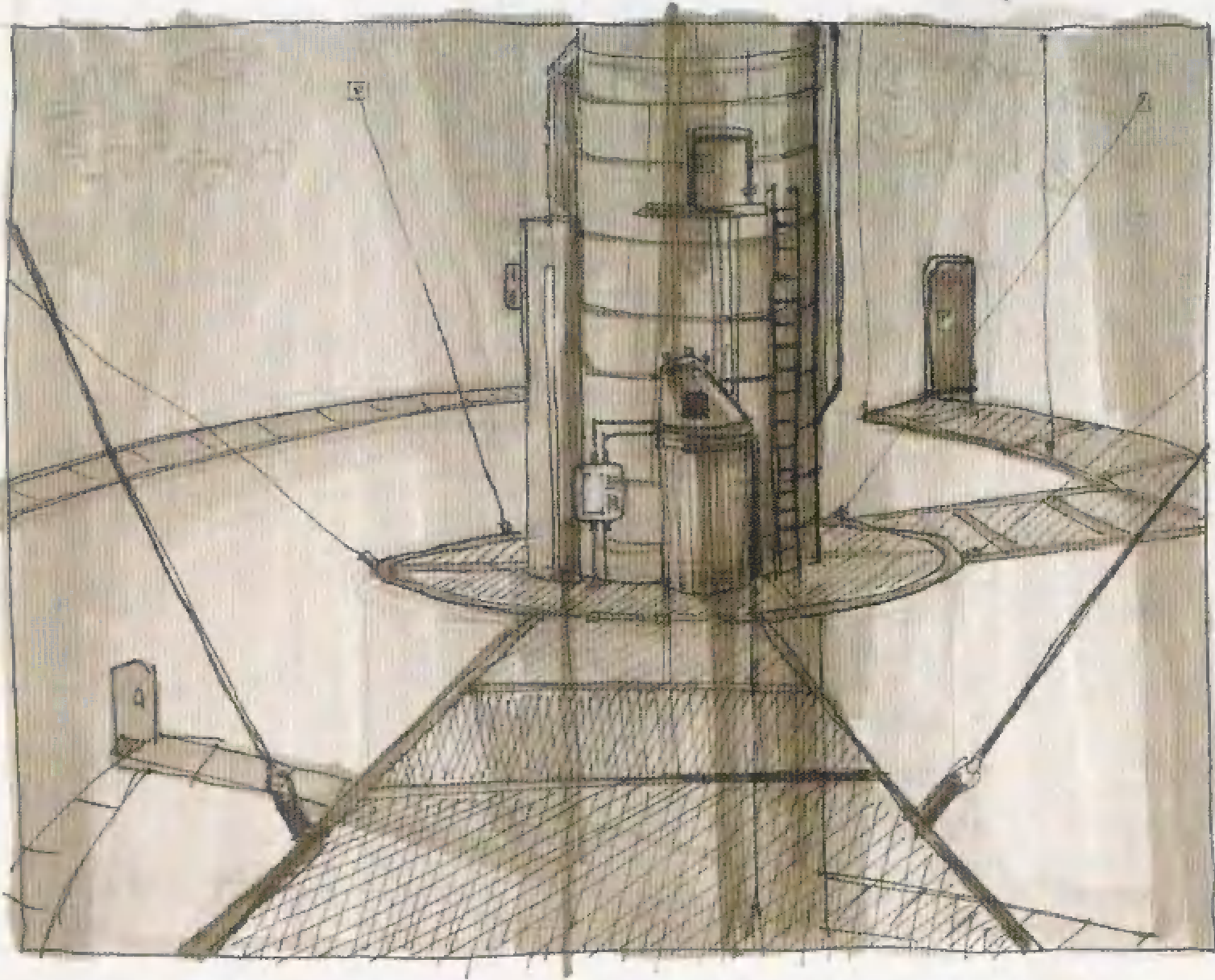
Level B - High security area- just out of elevator - metal detector & shielded security cameras

One influence on the storyline and prickly emotional horror of *Half-Life* was *The Outer Limits*, especially the episode "The Borderland," which tells the story of a team of scientists who manipulate magnetic fields to enter the fourth dimension.

"The original concept for *Half-Life* came from folks here thinking about Stephen King's short story 'The Mist,' along with a healthy dose of *X-Files* style conspiracy thrown in." - Yahn Bernier

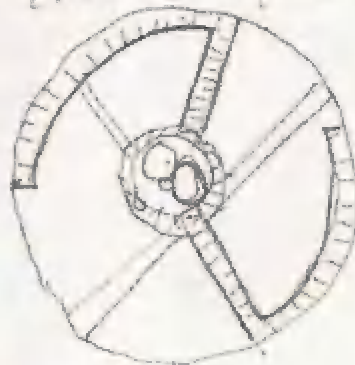
REFURBISHED MISSILE SILO - FLOOR B, MISSION 1, EPISODE 1 (SILO #2)

Particle accelerator occupies middle portion of silo -

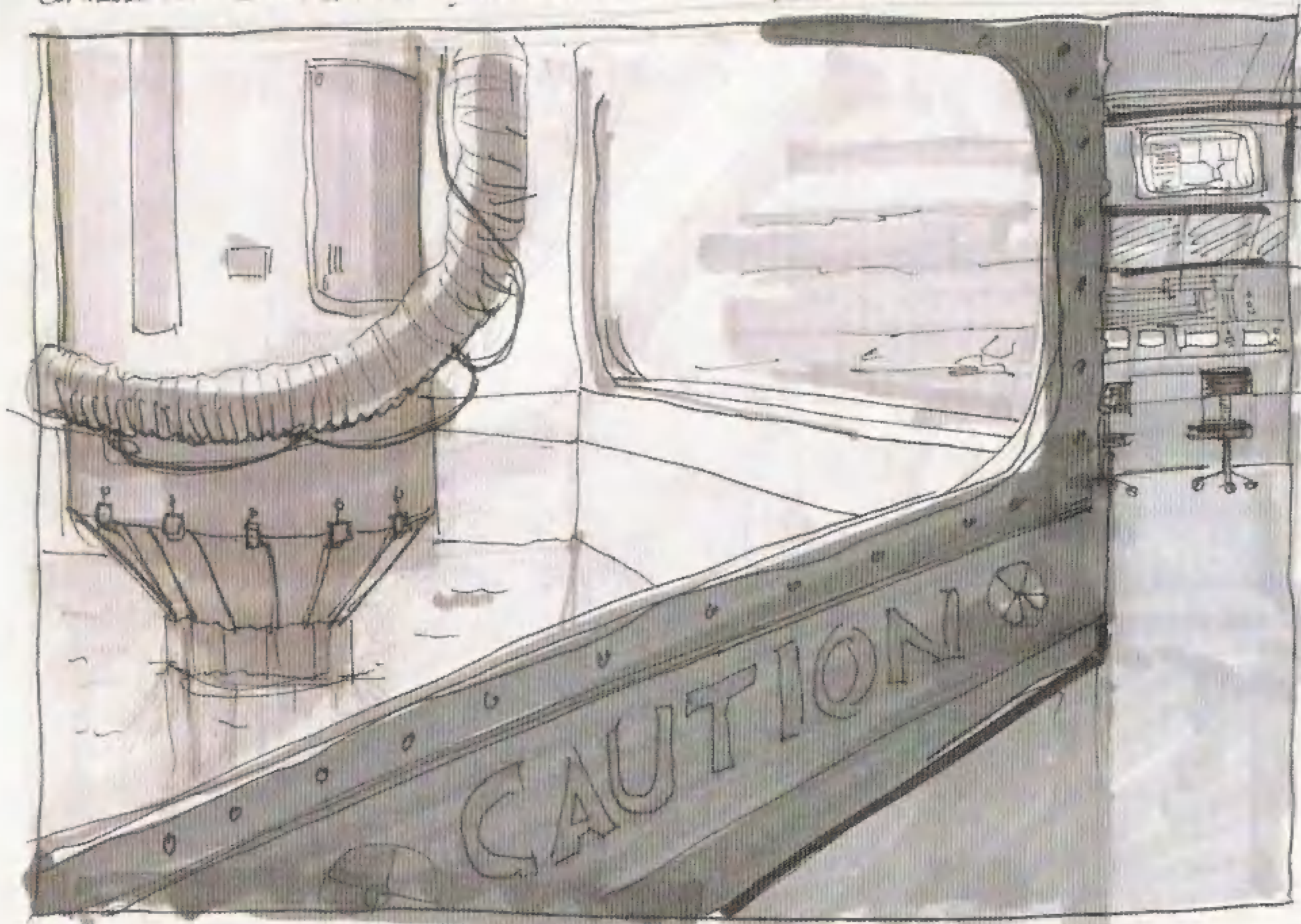


REFURBISHED SILO WITH NEW CATWALKS & CENTRAL POWER CORE LEADING DOWN TO ENERGY FIELD ROOM - CATWALKS WIND AROUND, & GO DIRECTLY ACROSS SILO LEADING ALL THE WAY DOWN TO LEVEL C - NOTE - THIS IS THE SILO ASSOC'D W/ THE KEY ROOM PUZZLE OLD MILITARY MARKINGS LINE THE SIDES "SILO #2, S.A.C., USAF, ETC" PLAYED SHOULD, WITH SOME DIFFICULTY, FIND THEIR WAY TO THE TOP, LOTS OF SUPPORT CABLES HOLD UP STRUCTURE -

Cross-section / top



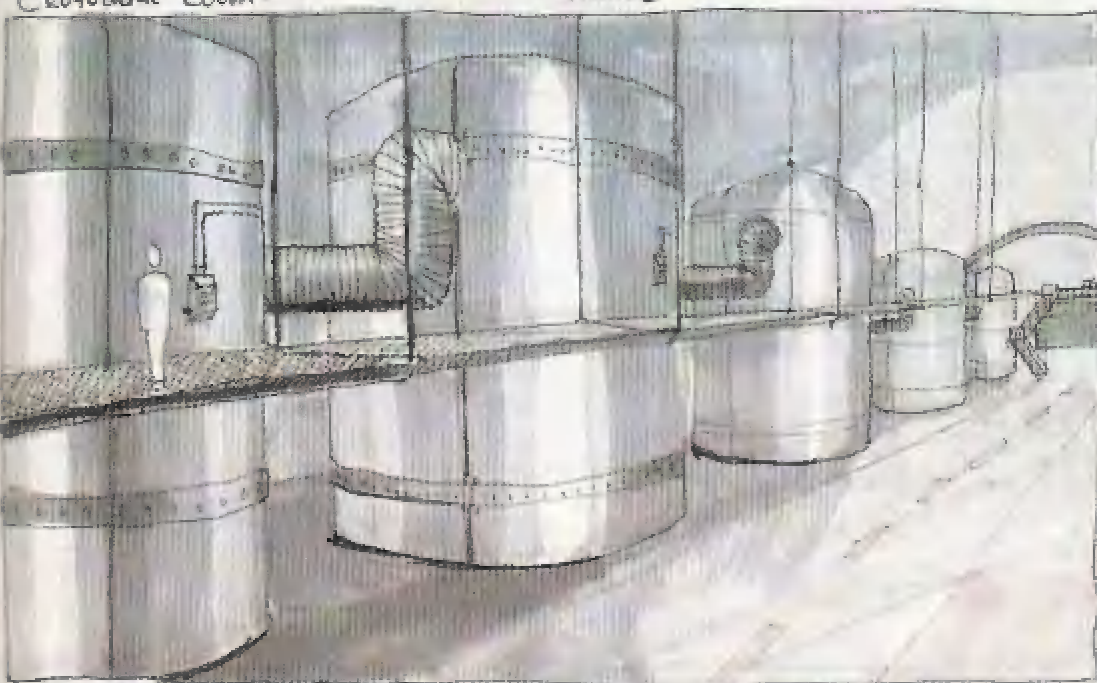
CONTROL ROD COOLING TANK & CONTROL ROOM IN BACKGROUND -



Possible site of puzzle - averting meltdown / explosion caused by initial power surge in gate room.

Cryogenic Room -

FLOOR



Room should have emergency stopping switch (handbrake) from cryogenic tanks.

Space behind tanks. Large stainless tanks, below 'walk' effect of shoes. (not obvious) of stainless 'human' access - all tanks (control room hand interface)

This walkway leads to 'animal research lab' access to lower level of this room by cable rope or hand door from other passageway.

entering in cage, trigger a creature to come into floor - choose to work in cage or run for it. Windows above for door (corridor to main Lab) (chem lab floor 2.)



Cage door open - provides an disgusting

WALKWAY OVER LARGE ANIMAL AREA - LARGE, EMPTY CAGES W/ TRACES OF CORE.

Black Mesa

Ted Backman

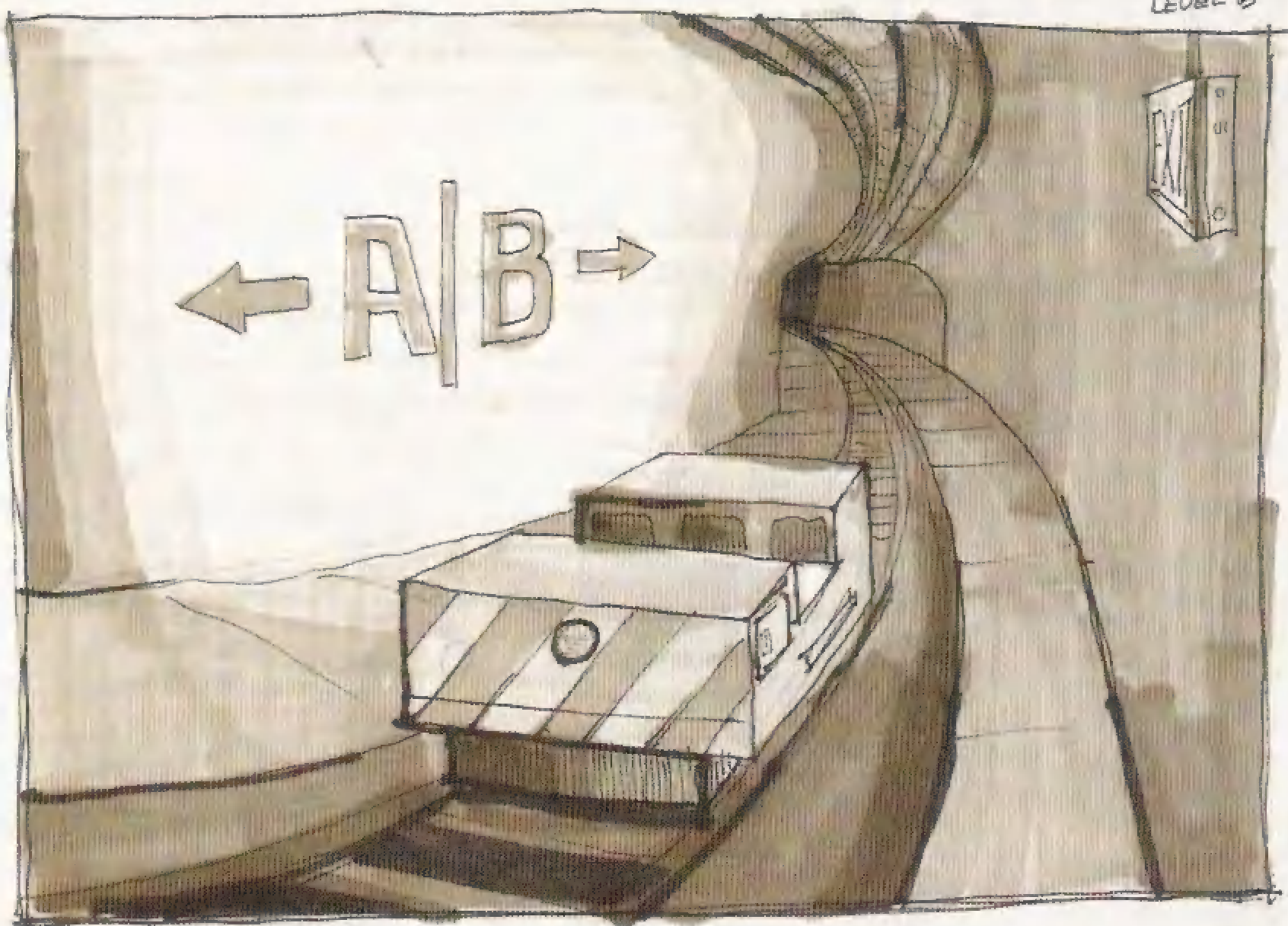
Clockwise from top left: a missile silo, two views of a Xen Cryogenic storage facility, train tunnels, and a reactor control room.

"Kelly Bailey and I only had a weekend to get the test chamber disaster sequence built. We worked for 48 hours straight. Mercifully, I had both food and a comfortable chair to sit in, but Kelly sat atop of a wooden sawhorse we affectionately dubbed 'The Throne of Woe' in order to keep awake. We barreled through it and went home for a few hours of sleep and came back Monday still in a zombie-like state. Everyone in the office was all excited about something, but it took a bit for me to realize they had found the sequence and all played through it; everyone just loved it. It was just one of those great moments." - John Guthrie

TRAIN TUNNEL W/ SERVICE CAR - ELECTRIFIED TRACKS - ILLUMINATED BY EXIT SIGNS

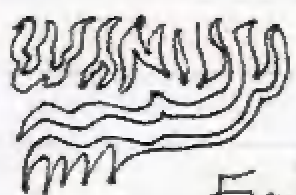
LEVEL B

train runs between 5 silos - access to tunnel #1 (must go to top of silo by going off the top of tunnel) gained by power



small walkways on sides of tunnel - stepping on tracks does major damage - 'danger' signs on wall warning of electrification

The original, scribbled script for the Black Mesa test chamber sequence



Enter Test Chamber

Door servos shut - not getting out

You get service cart - something scurries
out of it - alien? -

A.M.S.
antimass spectrometer

Countdown -

[Time to look around.]

VOICE 1
(low)

All right, Gordon - your suit should keep you comfortable through all this. The specimen is being readied even as ~~we~~ we speak. We will warm up the ~~analyzer now, A.M.S.~~ antimass spectrometer now, and see if we can hold her steady at 80% until the carrier arrives.

VOICE 2
(med)

Power in three... two... one...

FIRST STAGE HUM

VOICE 1

Predictable arrays. Very good. Gordon -

VOICE 3
(high)

Mister Freeman, ~~you~~ you might want to stand back from the ~~delivering system~~ focal beam, at ~~least~~ during this ^{next} phase, suit or no suit.

VOICE 2

You weren't planning on having children, were you, Gordon?

V3

Nonsense! Nothing's been proven!

VOICE 2 Secondary emitters, activating now.

2^d phase of Motion + Sound

VOICE 1 It looks like the crystal sample is ready, Gordon.
Look ~~to~~ the delivery system for your specimen.

Rises from floor

VOICE 1 Standard insertion ~~for a nonstandard specimen.~~
~~not so standard on~~

Go to it.

VOICE 3 Wait!

VOICE 2 Capacitors to one oh five percent. Initiating black box messaging.

VOICE 3 What?

VOICE 1 Gordon, we're bringing the analyzer to ~~superoptimal~~
superoptimal performance. There's no telling
how long the system can take it - or how
long the reading will take. Please work
efficiently.







$\lambda = \frac{\ln 2}{T_{1/2}}$ = decay constant

Extra Life: The Mod Movement

.02

For many gamers, beating *Half-Life* marked the beginning of a new, even greater challenge: Making a game of their own. Countless talented *Half-Life* fans—programmers, artists, and level designers—loaded up Valve's Software Developer Kit and set to work on their own designs. In addition to custom levels for online play, the mod community began to create new worlds from scratch. From the fertile minds of the fans came such enduring mods as *Team Fortress*, *Day of Defeat*, and *Counter-Strike*. These titles in particular stood out in the crowd, as Valve encouraged the developers by giving them the chance to work on their games full time, bringing them to a wider audience through the channels opened up initially by *Half-Life*. In the case of *Counter-Strike*, the doors were more like floodgates...and there was no holding back the tide.

Team Fortress

It all began with *Team Fortress*, the first team modification for *Quake* featuring team-combat gameplay. Co-creators Robin Walker and John Cook were hired by Valve in early 1998 to help ship *Half-Life* and port *Team Fortress* to *Half-Life* technology. This grew to become a *Team Fortress Classic* which, in addition to becoming the number one online action game of its time, also played a critical role in helping Valve shape future versions of the *Half-Life* SDK.

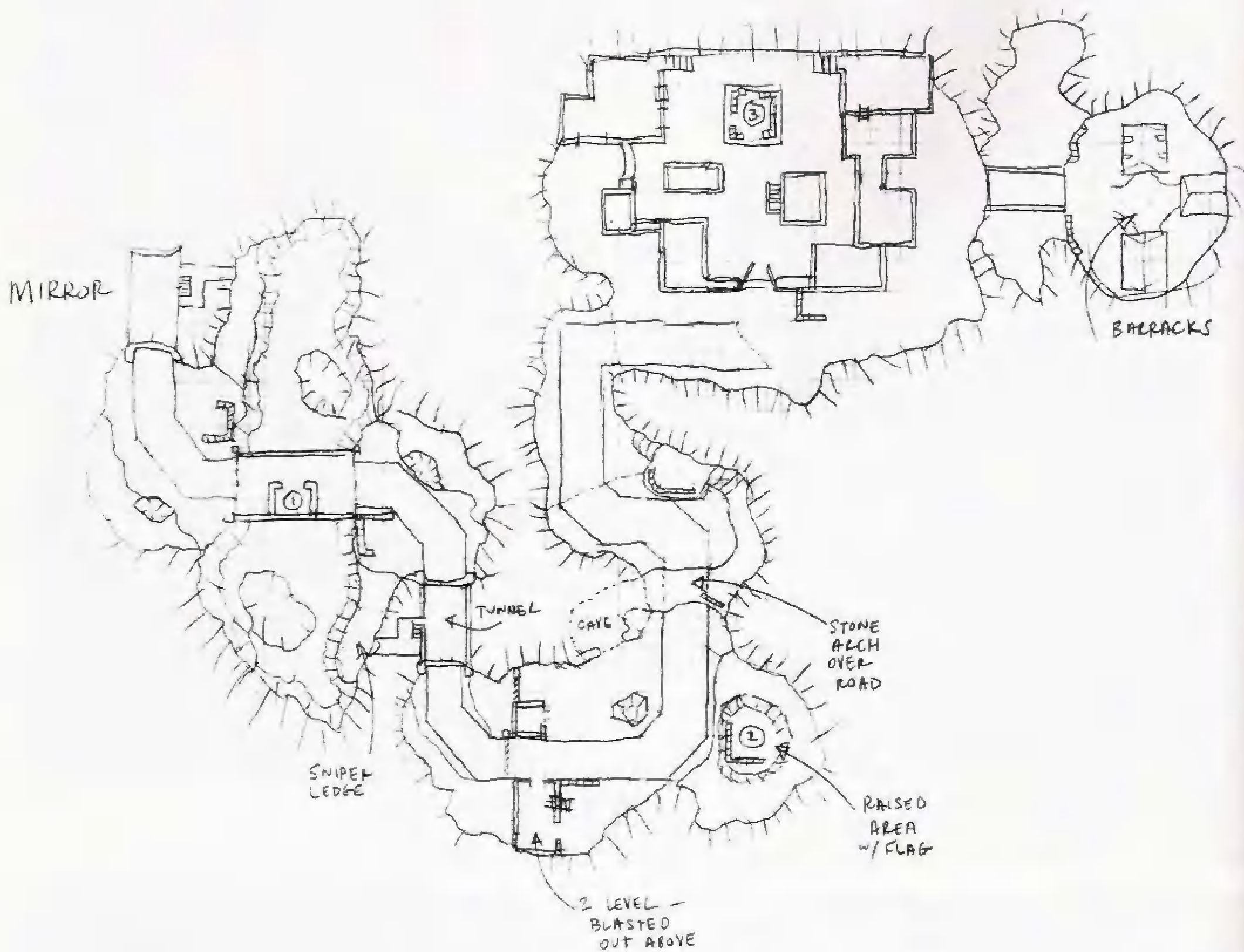




Strong defensive lines were essential in many *Team Fortress* maps, preventing enemy teams from stealing flags, planting bombs, capturing control zones, assassinating a VIP, and more. Many of today's standard multiplayer FPS gametypes were first seen in a third-party *TF* map years earlier.

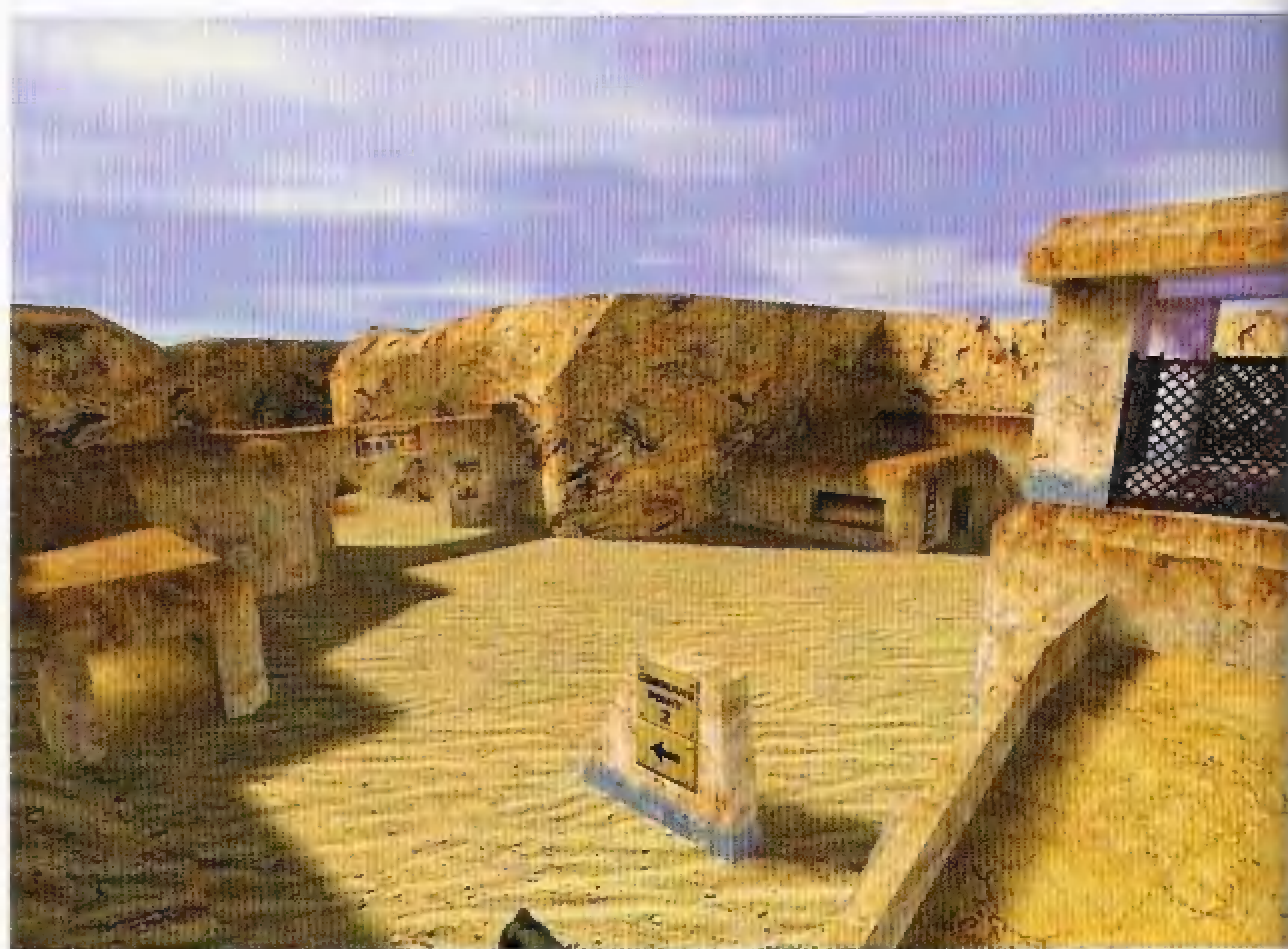


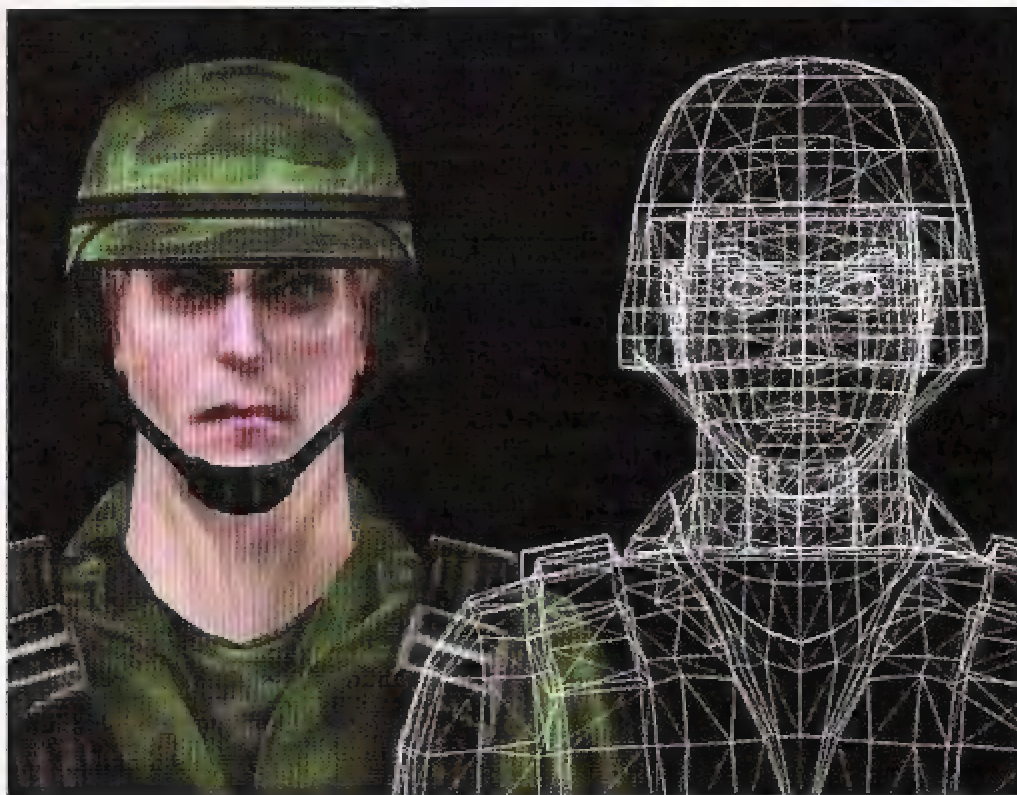
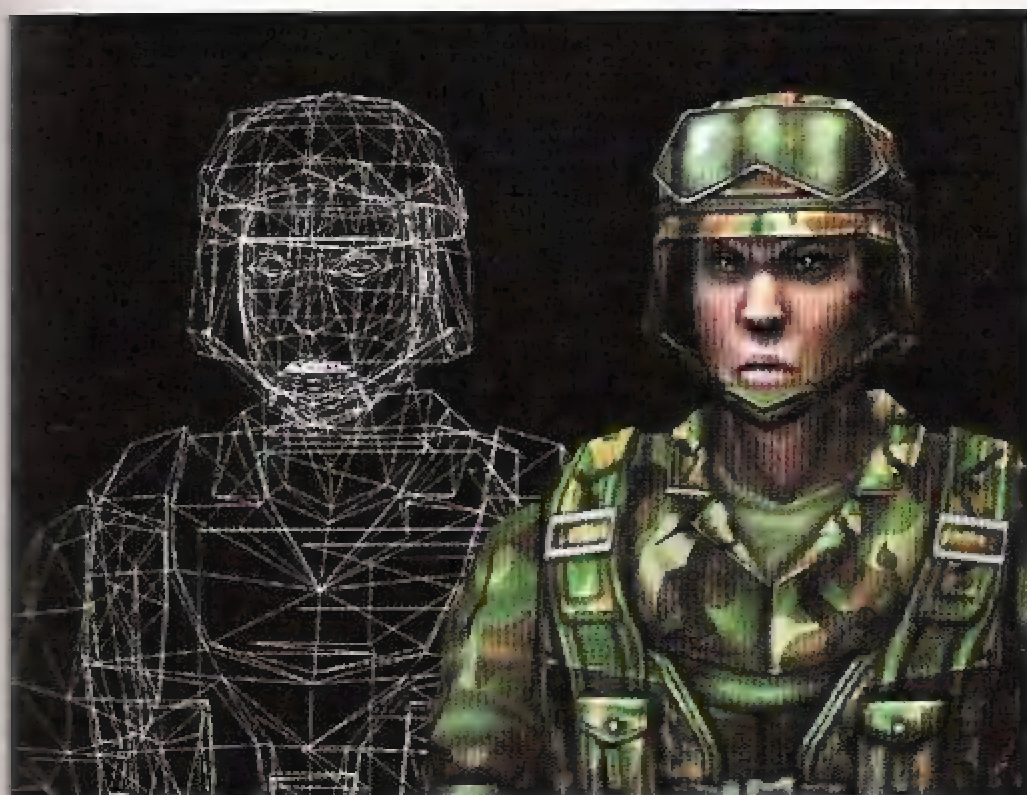
Top, from left to right: Medic, Engineer, Sniper, Scout, Demolitions Man, Soldier, Heavy Weapons Guy, Pyro, Spy. Bottom, from left to right: Scout, Spy, Sniper, Heavy Weapons Guy, Demolitions Man, Medic, Pyro, Engineer, Soldier.



Warpath

"After the initial design discussions, maps were sketched out by the design group, and then built by the level designers. Once the initial version was complete, regular playtesting began. Many changes were made throughout the playtesting cycle, often resulting in drastic changes to original plans for the map. The map you see here is Warpath, which was designed as a linear control-zone map. Teams had to push forward and hold a control zone on the line. Once secured, the team could push forward and attempt to capture the next zone. This was the first TF map in which teams respawned in different locations based upon which control zones their team controlled, and this led to a long test cycle where respawn points were moved many times." - Robin Walker





Team Fortress 2

Chuck Jones

Renders of foot soldiers, and the Pyro and Heavy Weapons class, from 2000. The *TF2* art direction moved away from *TFC*'s cartoon-esque look, aiming for more gritty visuals.



Day of Defeat

The *Day of Defeat* team released Beta 1 of the World War II-themed modification in January 2001. As a result of the game earning a cult following through constant updates, the team was hired by Valve and *DoD* was released at retail in April 2003.

"No PC FPS game had really pulled off the feel and immersion that we wanted in a WWII game, so we made our own. I think everyone who creates a mod has visions of taking it all the way. We were pretty lucky to have that opportunity."
- Jakob Jungels





American, British, and German troop renders





An early "pajama-clad Arab" player model

Counter-Strike

In spring 1999, Minh Le and Jess Cliffe began working on *Counter-Strike* as a mod for *Half-Life*. That June, the first Beta was released. By 2000, more people were playing *Counter-Strike* than Valve's commercially released multiplayer games. Le and Cliffe were offered jobs by Valve to continue working on the game full time. Today, *Counter-Strike* generates more Internet traffic than the nation of Italy.

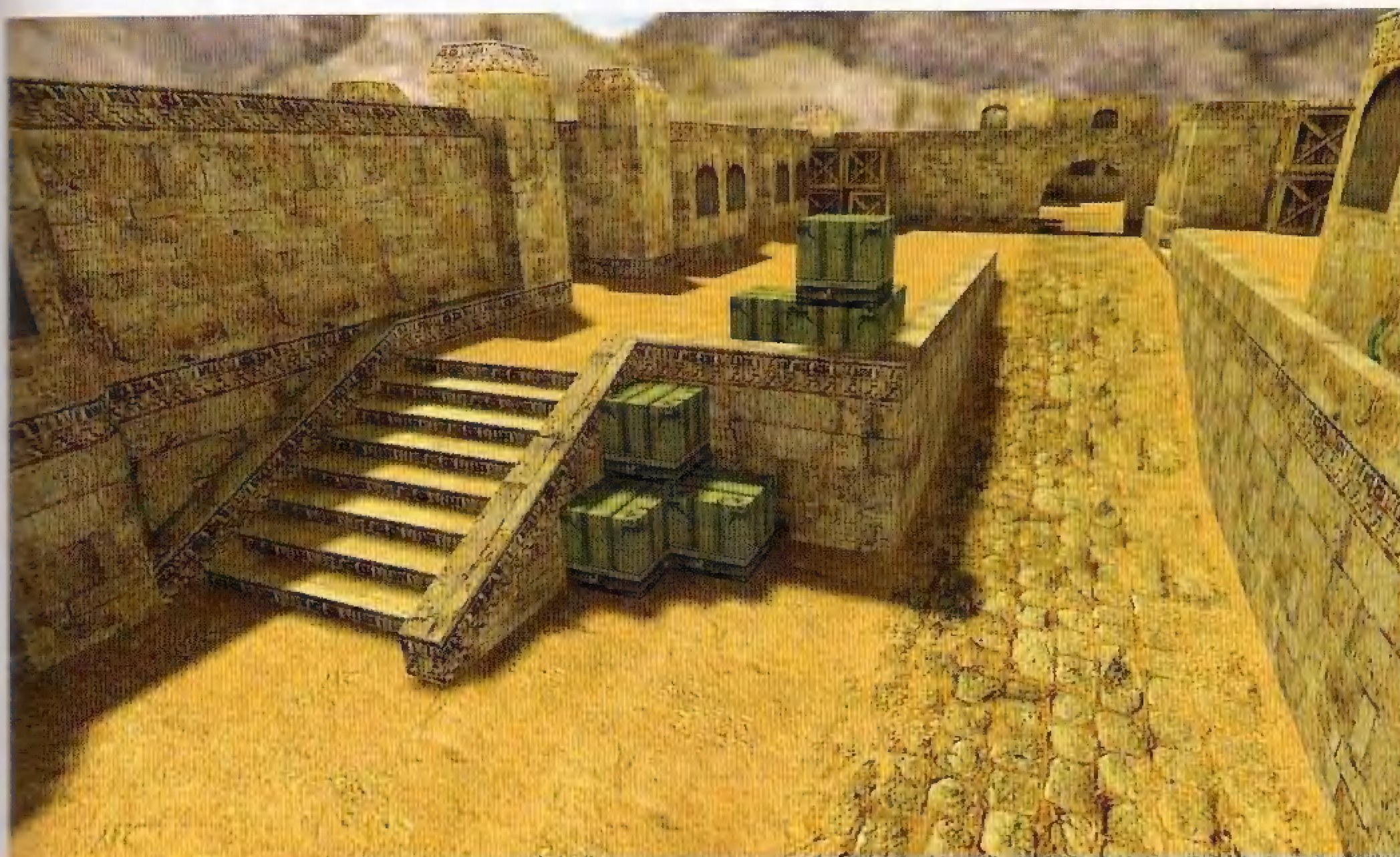
"We were both into counter-terrorism for a while and had been making mods in the community for years. I had made a CT-themed mod for *Quake* called *Navy Seals* and we'd worked together on *Action Quake 2* before leaving to do our own thing, which was *Counter-Strike*." - Minh Le

"I remember during the Beta 6 release, one teenage kid from Florida hosted the install file on his ISP's webspace. The release was so heavily downloaded that this systematically took down his whole ISP for a day or two, losing them thousands upon thousands of dollars. The kid was arrested by the police and spent time in a juvenile detention center. He was just trying to serve up some CS for his friends who lived close by. I'm not sure if he just didn't know how many people would download it and what the effect would be. I don't want to imagine the poor knock-kneed kid's night in the hoosegow, but to have landed someone in the slammer for just putting our files up for download was a pretty bizarre indication of the popularity of the game." - Jess Cliffe



Hostage Sketch
Chuck Jones

Dave Johnston and Chris Ashton's Dust remains the most popular map in the history of the game.





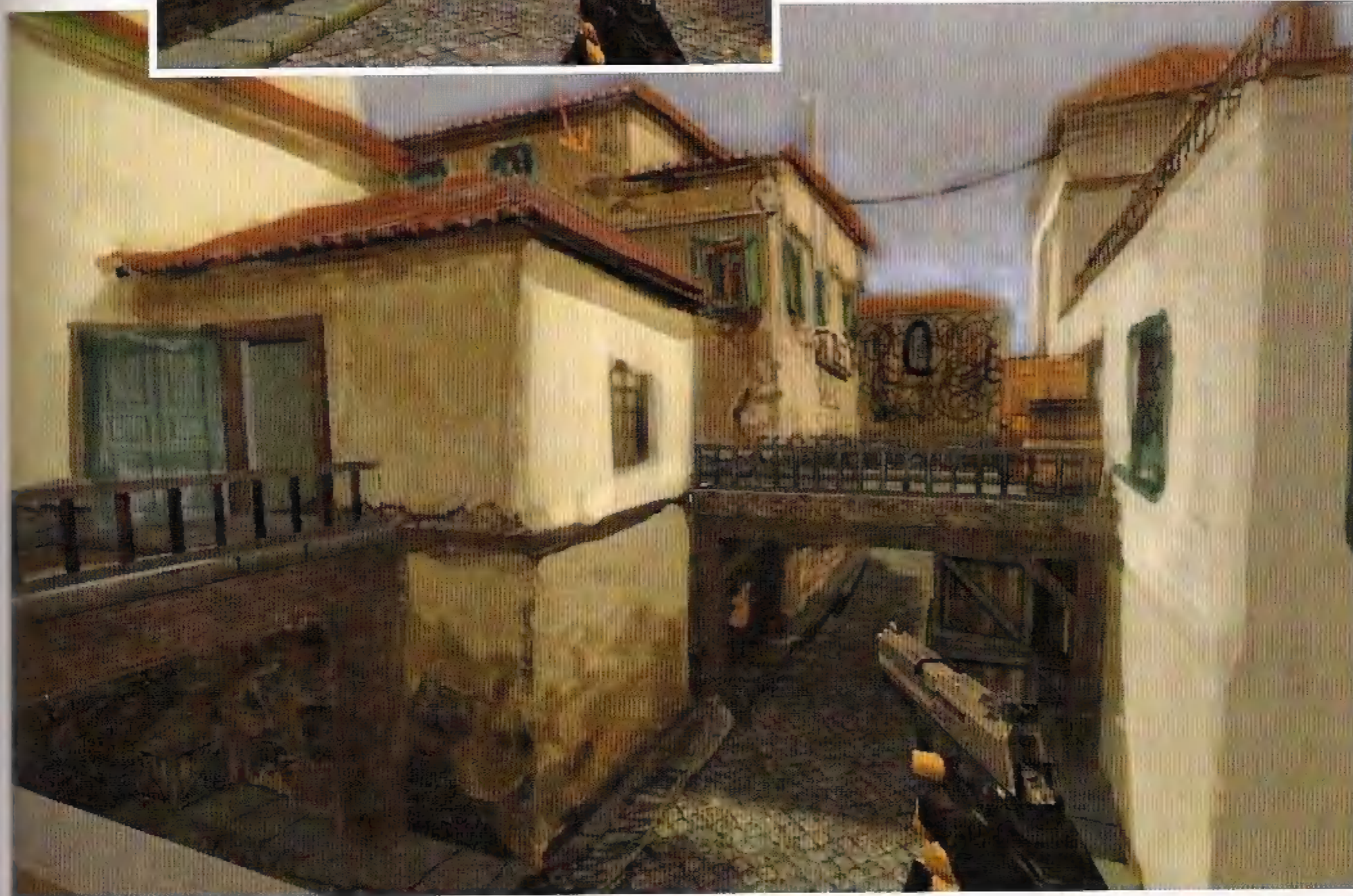






Counter-Strike: Source

In 2004 Valve decided to bring *Counter-Strike* forward to the Source engine as the natural choice for *Half-Life 2*'s multiplayer component. Original co-creators Minh Le and Jess Cliffe were part of the project along with members of the *Day of Defeat* team and other Valve developers. The new version of the game, dubbed *Counter-Strike: Source*, features enhanced environments, physics, and shader-based DirectX 9 rendering. After a Beta period in summer 2004, the game was released with *Half-Life 2* in the fall.



Italy

Kristen Perry

"One of my favorite maps to work on was Italy, with its colors and materials that are more vivid than other map atmospheres. I first took a lot of screenshots to create the scenes anew in a paintover. If you compare the concept of the marketplace to the final output of the map, you'll see nearly a texture-for-texture recreation of the sketch." - Kristen Perry



Italy

Kristen Perry

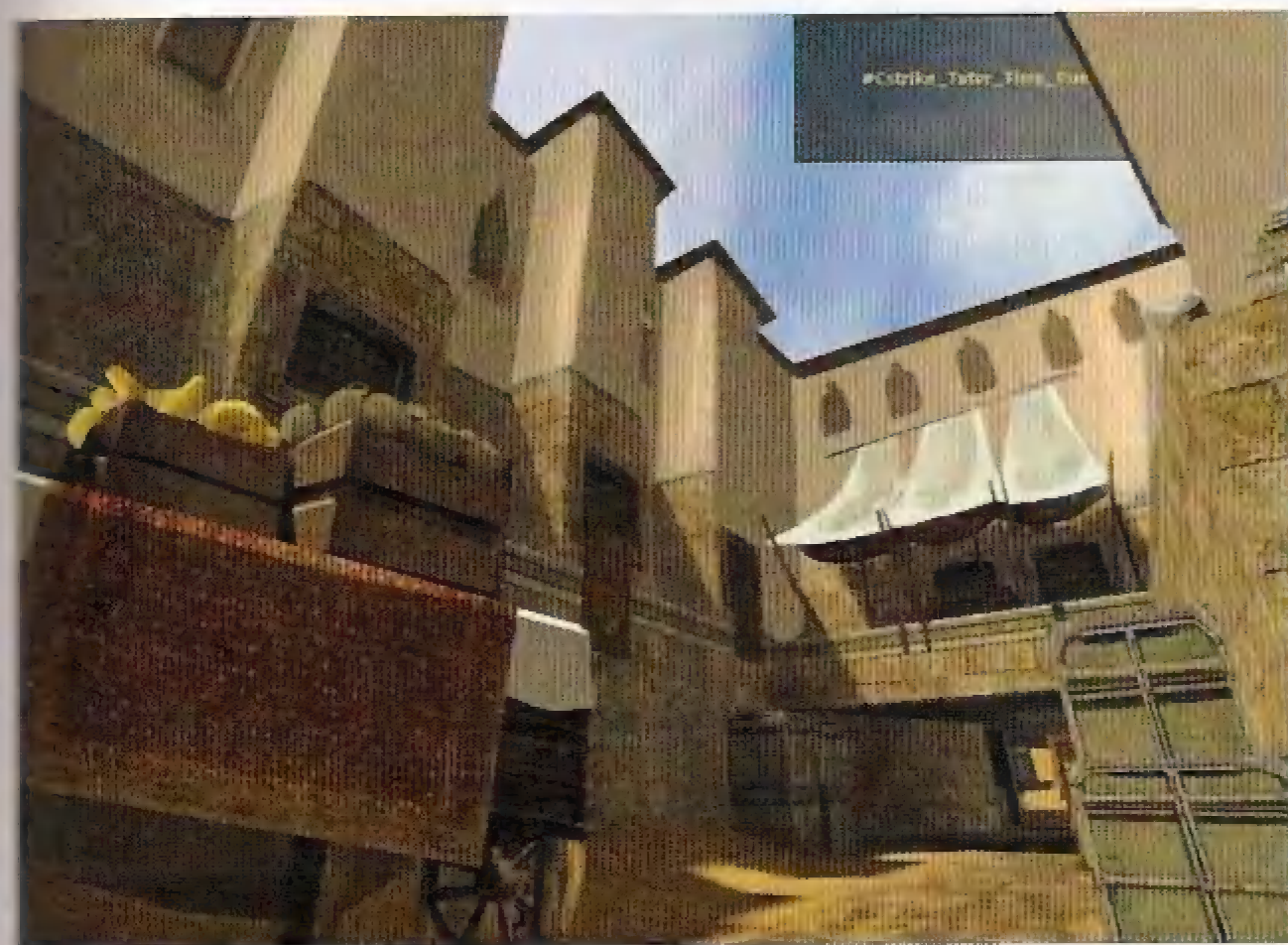
"For Italy, we combed through hundreds of photographs looking for real-life locations that roughly matched parts of the level. While keeping the architecture close to the original level for gameplay reasons, we added mood and contrast in building materials and detail." - Iikka Keranen



Dust

Kristen Perry

Artists added bump and the specular maps where performance budgets allowed. Textures have up to five different levels of textural elements.





Aztec

Kristen Perry

One of the most important aspects of re-creating the popular *Counter-Strike* maps was keeping the base layout intact, in order to make the player's transition from *Counter-Strike* to *Counter-Strike: Source* as seamless as possible. Once this layout was laid down and the rest of the map gutted, new details could be built on top.

"One of the great freedoms of the graphic upgrade was a literal 'the sky's the limit' go-ahead on the vertical. We could build towering temples, endless buildings and mountains, or surround the map with a 3-D skybox mimicking a residential city."
- Kristen Perry





Havana

Kristen Perry

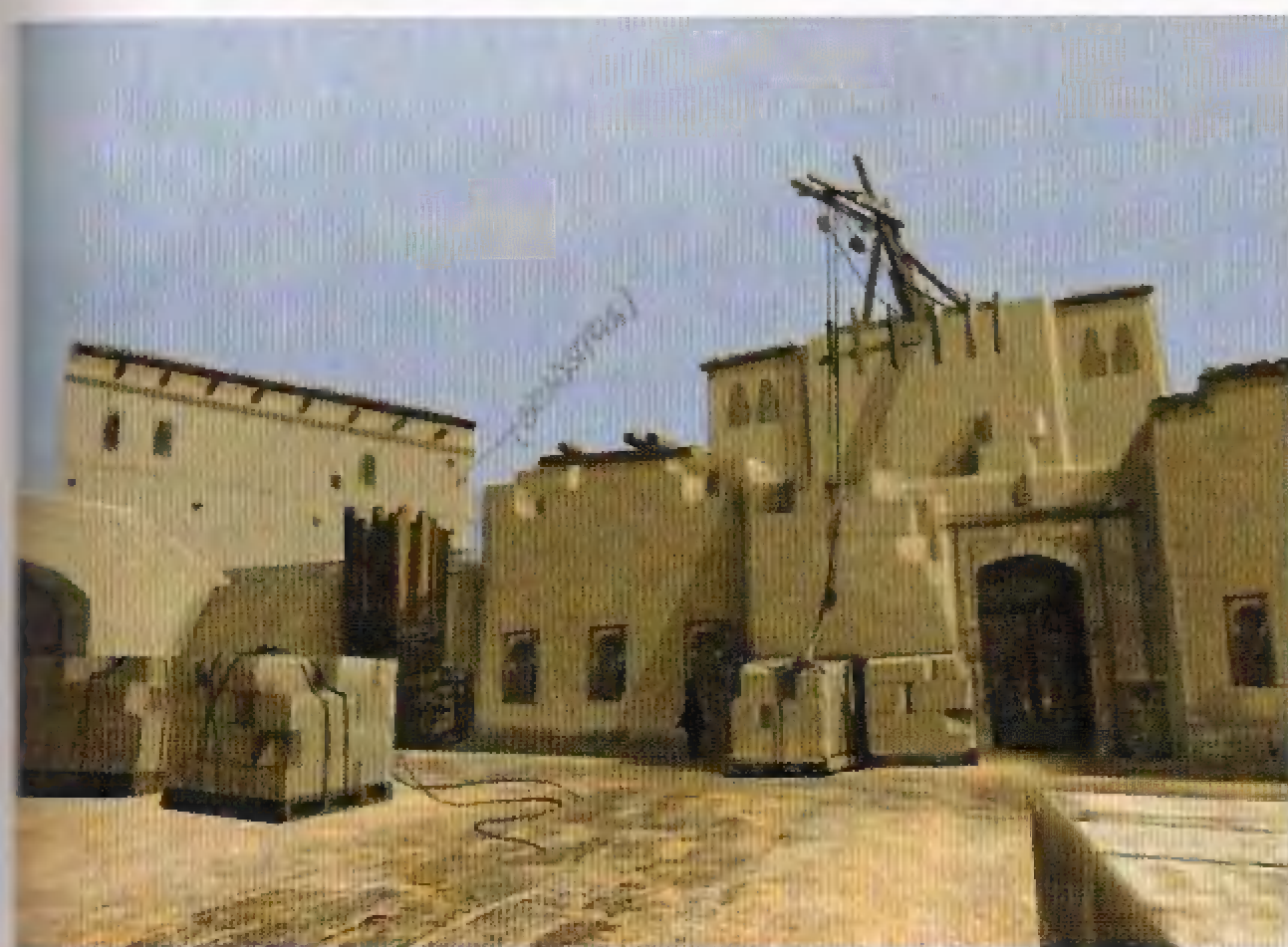
"CS:S uses the physics system to simulate ragdolls when a player dies. This way, no two player deaths look exactly the same. Players will trip, fly, and cartwheel in a myriad of ways depending on where the killing blow was dealt from and where they were standing."

- Mike Dussault

Chateau, Italy, & Aztec
Kristen Perry

"The Source engine makes it possible to create lush, natural-looking outdoor areas like the much-improved terrorist start location in Chateau. It was great fun playing with the terrain features, I think the modders will be able to go wild." - likka Keranen

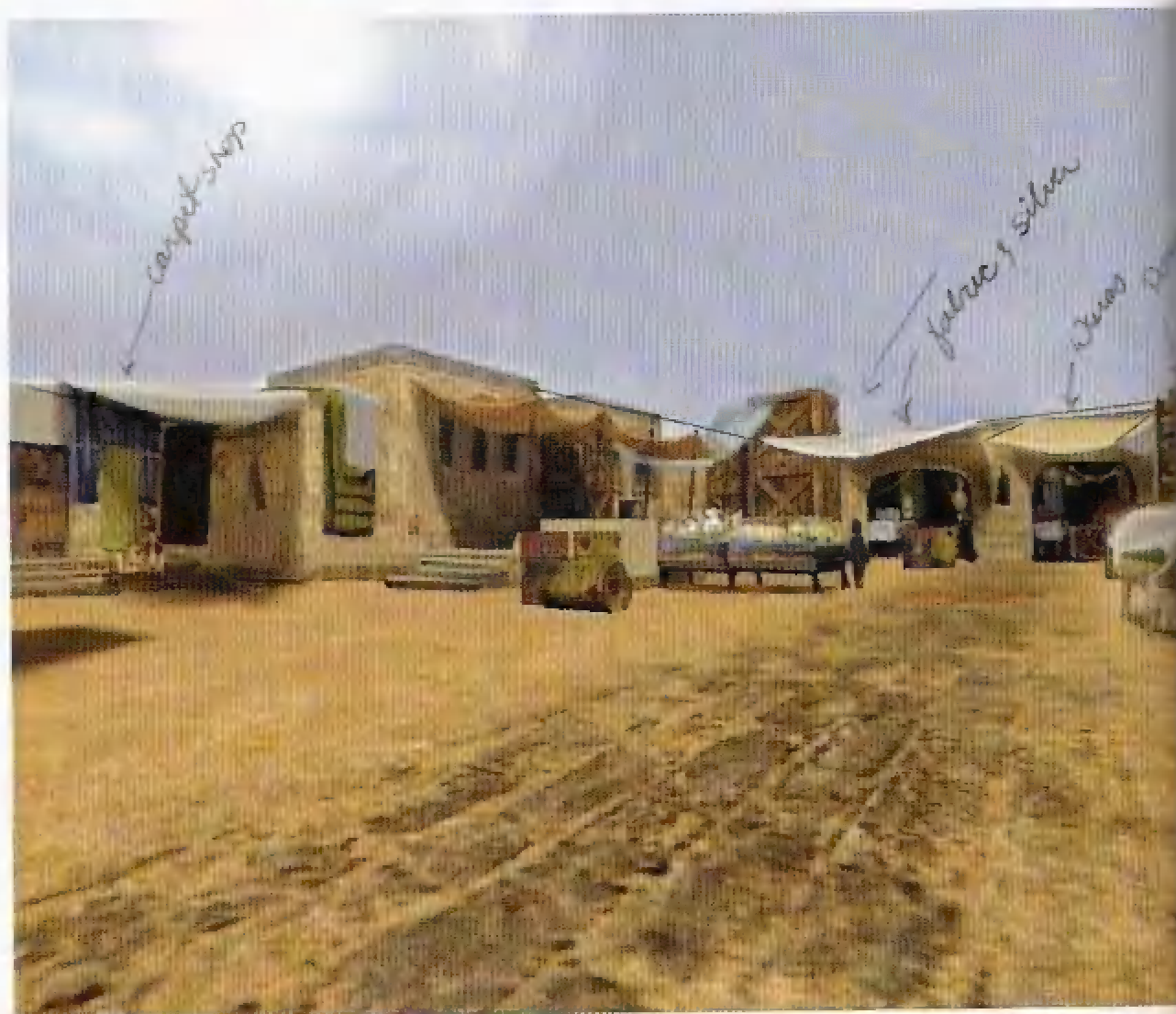




Dust
Kristen Perry

A firefight in-game (above) and concept of the Counter-Terrorist spawn point (left)

"When we first discussed converting the maps, we decided to focus on making sure they all had a real sense of location. Realism was one of the strong identities of CS when it came out, and as the engine's age increased, so did the amount of squinting you had to do to pretend it looked good. We scoured reference. We looked through books and movies and anything we could find, and picked the best elements from each. Dust is a mixture of North African, Turkish, and Andalusian influences. And for Aztec we actually used Mayan reference and Cliffe used sound-scape reference from animals indigenous to the area surrounding the ancient city of Tenochtitlan, modern day Mexico City." - Ido Magal



Italy & Dust

Kristen Perry

Concept of the Italy marketplace (above) and the in-game final product (left). The Dust marketplace turned bomb site (right).

"Real-time physics is one of the most important new features of CS:S. It adds more interactivity and helps to make the maps more authentic. A good example is the watermelon in Italy. When shot, it breaks into 15 smaller pieces, which all fly around, spinning, bouncing, creating dust and sound effects. As far as physics, the only thing I think we're missing is a huge monkey on top of the new pyramids in Aztec throwing down barrels." - Martin Otten

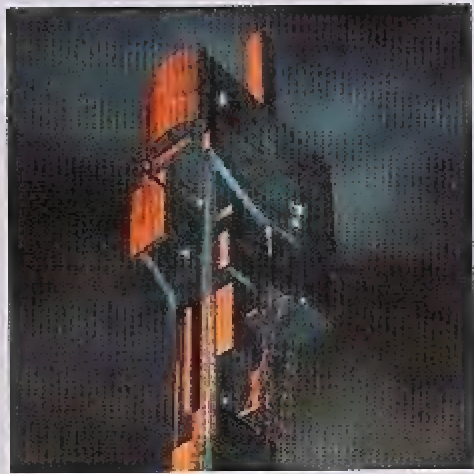


Navy Seal & Phoenix Faction
Moby Francke

Model sheets for the new *Counter-Strike: Source* player characters

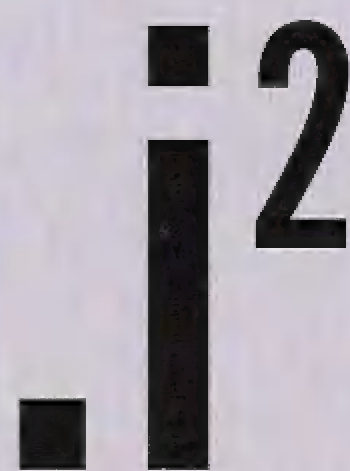






AL2

Investigation 2: Unexpected Interference



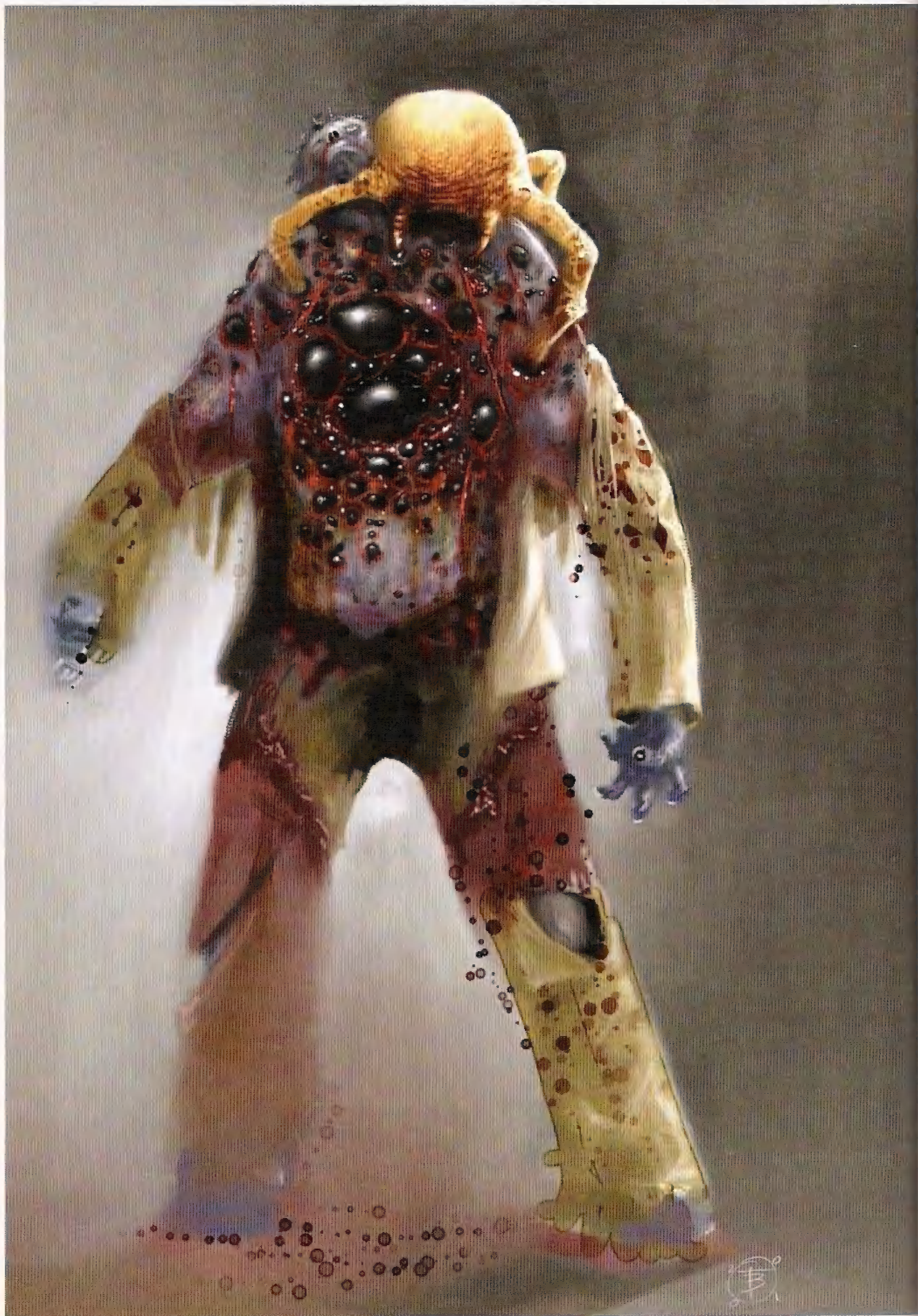
Half-Life had not been long on store shelves when Valve set to work on *Half-Life 2*. The “only” requirement was that it had to be the best game ever made, surpassing *Half-Life* in every way possible. Fortunately, while the designers had given their all to the original game, they had no problem coming up with a long list of things they wished they could have done better. But building *Half-Life 2* was not to be merely a matter of improving on the previous game, continuing the story where the first left off, or increasing texture resolution. It would involve an overhaul of every single element of the game, beginning with the most basic: The engine. Piece by piece, the *Quake*-derived *Half-Life* engine was discarded as Valve began developing something all its own, the proprietary engine technology now known as Source. In the meantime, a call went out for programmers, level designers, artists, and animators who had seen the promise of *Half-Life* and wanted to push the medium of games into truly new terrain. As a new team formed around the core of original designers, they discovered that the lessons of *Half-Life* didn’t always apply. *Half-Life 2* turned out to be an entirely new beast, and the path to completion proved to be much rockier, and far longer, than anyone initially expected.



Half-Life 2: Creature Discomforts

03

If the creatures that stalk the wastelands of *Half-Life 2* could fill the City 17 Zoo, those that never made it into the game could provide the ecosystem for a mid-sized Combine planet. For every monster that made it into the final game, dozens more were dreamed up. While most creature designs never got further than rough sketches, others were painstakingly modeled, textured, animated, and coded before reaching their own personal Doomsday. Here is a collection of some of the critters that populate the imaginations of *Half-Life 2*'s creature creators. The toughest ones were hardy enough to survive rigorous playtesting, and came to full maturity in *Half-Life 2*. Others were throttled in their sleep, and may never see the light of day outside these pages. Then again, a real monster never dies. . . .



**Zombie**

Ted Backman

"A lot of times in games, developers play the 'horror card' and try to make something that has big pointy teeth and make it as scary as possible. I have never been satisfied by that; it seems a little too heavy-handed and isn't usually scary. Instead of going for the horror response, I really like to make it more revolting; something that is just disgusting. When you look at a lot of things in nature, like maggots, they are not especially scary, but they are one of the most horrific things that you can think of if you really watch them. It is that sort of response that we are always trying to play up." - Ted Backman

Cremator

Dhabih Eng

The Cremator, a Combine janitor of sorts, was to wield a large spray hose that dissolved organic matter from the streets of City 17 after unrest had been squelched. A Cremator head can be seen in a jar of formaldehyde in Eli's lab.



Headcrabs

Ted Backman

"The Black Poison Headcrab is actually from an experiment that was made during *Half-Life 1* that we brought back and finished for *Half-Life 2*. The idea is pretty simple: it doesn't actually kill you when it attacks, it just leaves you with one point of health, no matter what. Black Headcrabs were a great tool for adding panic into an encounter. Once players had learned the distinctive sound of the poisonous crabs and knew the implications, they would spin around desperately looking for the creature regardless of their other foes. The mere presence of the threat thus made the other monsters in the scene more threatening and interesting."

- Tom Leonard



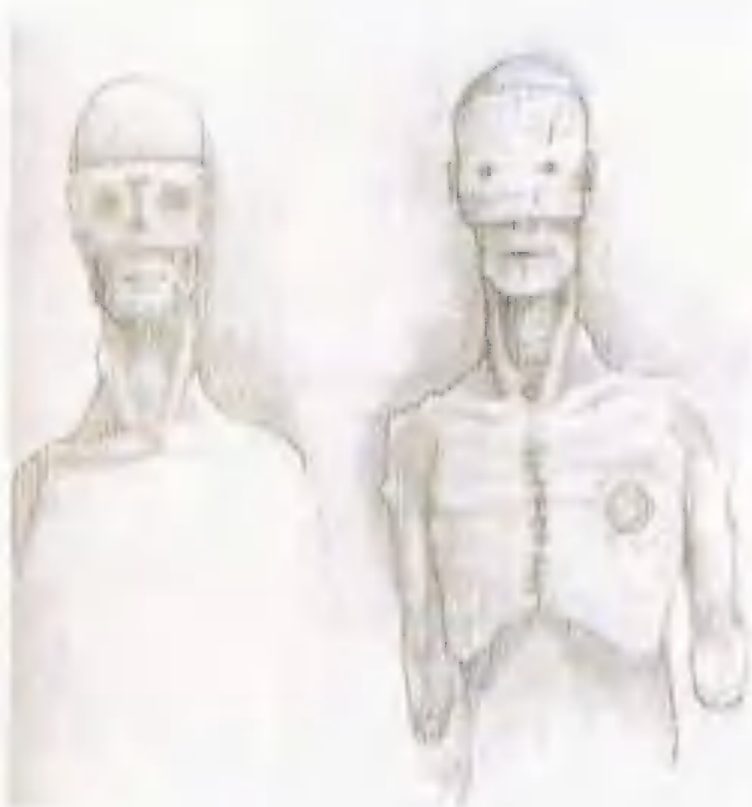


Zombies

The AI for the Fast Zombie was originally designed for an alien assassin, destined for a section of the game that never made it into final production. The AI was moved to various points throughout the game, eventually finding its best fit in Ravenholm. This prompted a series of designs to fit a model to a pre-existing AI framework—one of very few monsters designed that way in *Half-Life 2*.

“Creating the sound effects for *HL2* was a huge effort. We have thousands of unique sounds. I used a combination of library sound effects, my own recordings, and sounds I created using synthesizers as a basis for everything in the game. I’d usually start with a raw sound and then spend hours chopping it up and playing with it to get something unique or different sounding. I’ve used a variety of hunting calls for elk, coyotes, deer, rabbits, geese, ducks to try to come up with different vocalizations for monsters. I find there’s nothing like the sound of a bull elk call echoing down the halls in the afternoon to wake up your coworkers.” - Kelly Bailey



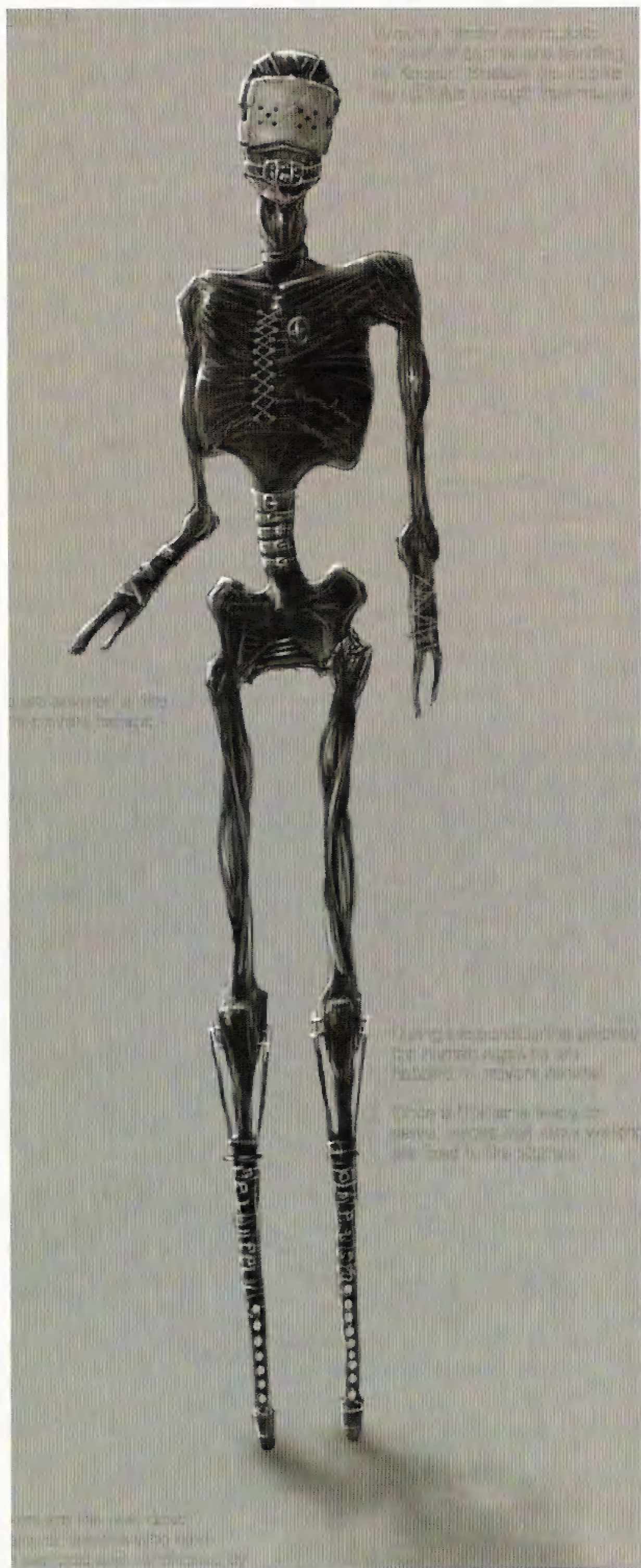


Stalker
Ted Backman

The Stalker at different stages of design, including a very early design with a muzzle, later concepts with blinders, a near-final design with weaponry, and finally, an in-game model









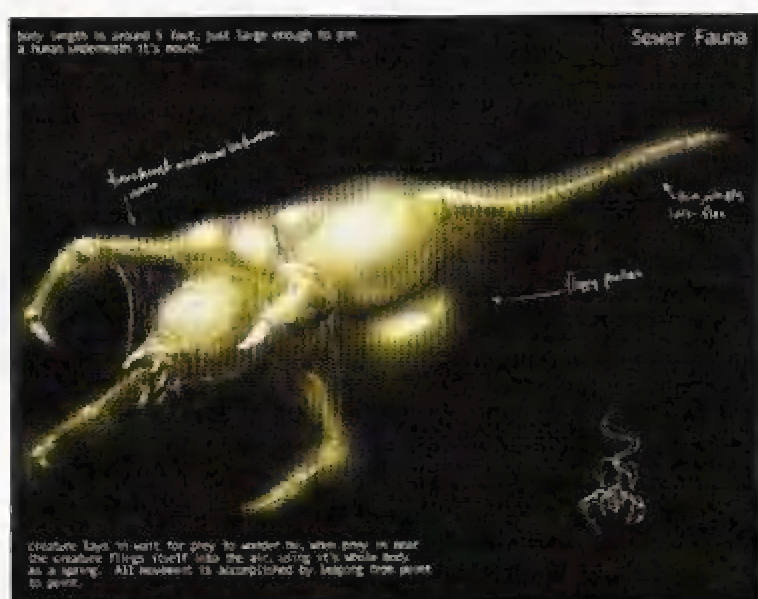
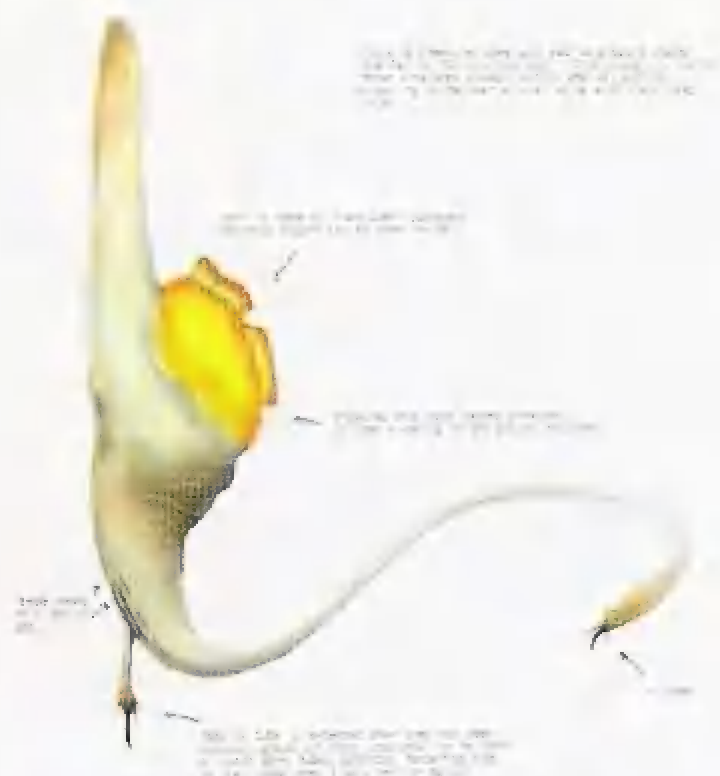
"I thought the Stalker was a great monster; it was this kind of nullified amputated human that the Combine turned into a slave laborer. They rip out all the organs and run them on saline solution so they are easier to maintain. The Stalker idea came from wanting something that crept around in the shadows and then lunged at you. We took a half-baked idea and turned it into something more horrific because the Stalkers are really the victims. When you face them, they are these crazed half-human things that you can't help but almost pity. I was hoping to put enough humanity into the things that it wasn't just a scary monster. Instead it was something that presented a moral dilemma every time you had to deal with it, which I think is a more interesting problem. It is more horrific to have to deal with an insane hostage than something that just wants to eat your brains."

- Ted Backman



Sackbombs are magic missiles, created by the same race that engineered the board. Sackbombs are delivered by magic air pods and are generally used to soften up an enemy position before an all out board assault.

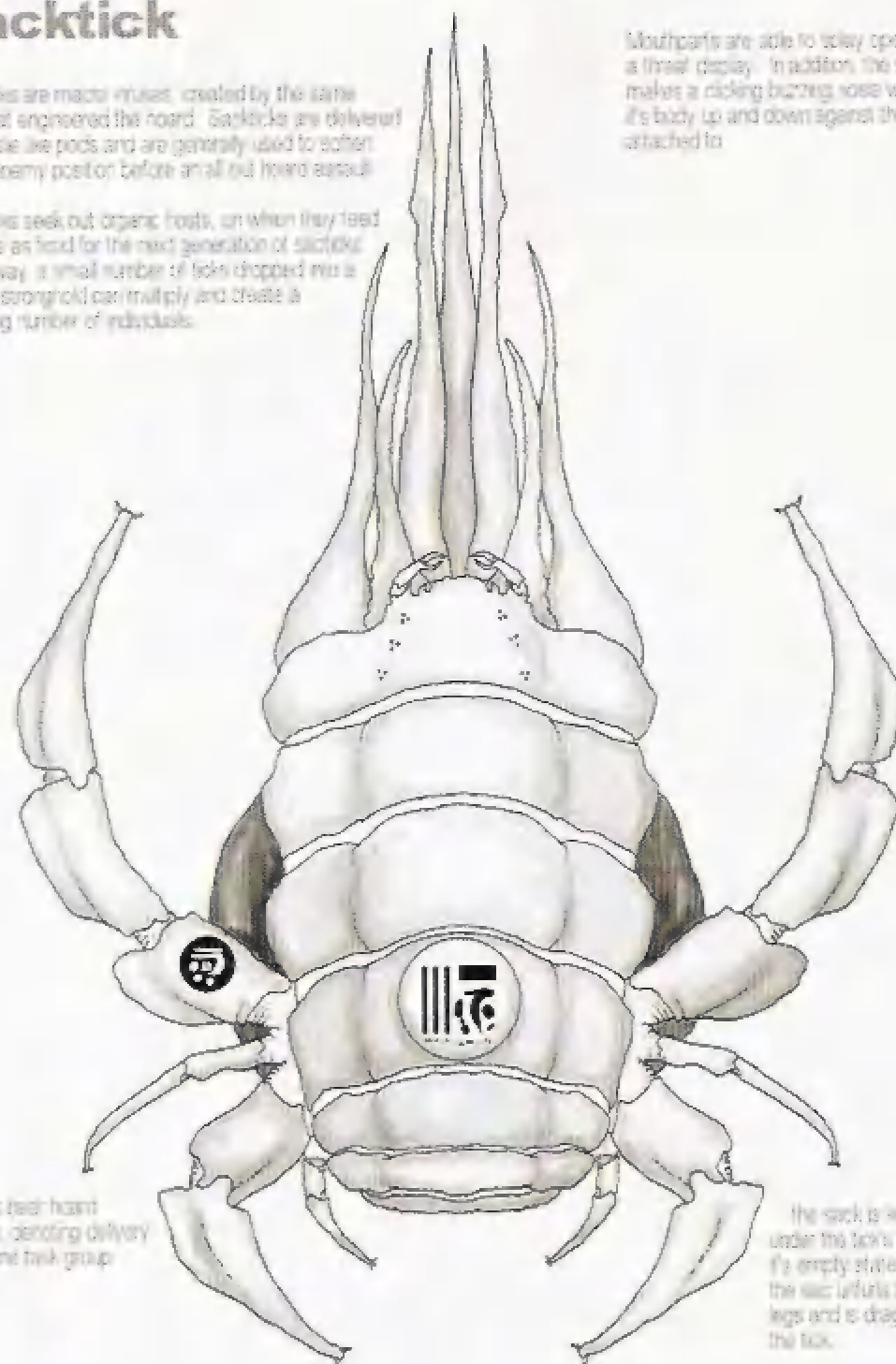
Suckers seek out organic foods, on which they feed and use as food for the next generation of suckers. In this way, a small number of fish dropped into a enemy stronghold can multiply and create a withering number of individuals.



A collection of unused alien creatures

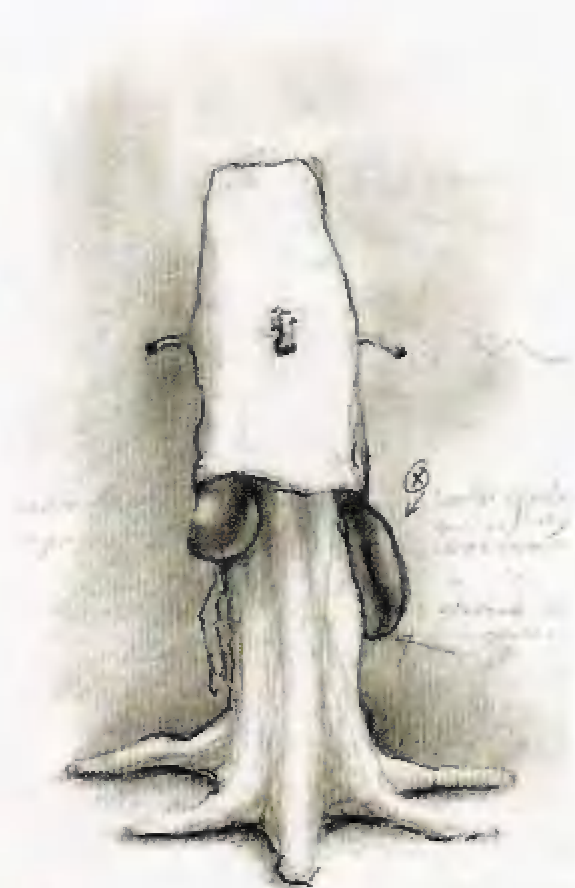
Sackbombs are magic missiles, created by the same race that engineered the board. Sackbombs are delivered by magic air pods and are generally used to soften up an enemy position before an all out board assault.

Suckers seek out organic foods, on which they feed and use as food for the next generation of suckers. In this way, a small number of fish dropped into a enemy stronghold can multiply and create a withering number of individuals.



Alpha masked quadr for hair - ride on flex controllers

creature moves by hopping from point to point - tries to land on plump head - moving stream some kind of fluid from mouth



The Stampeders, Alien Fauna, & Houndeye
Ted Backman



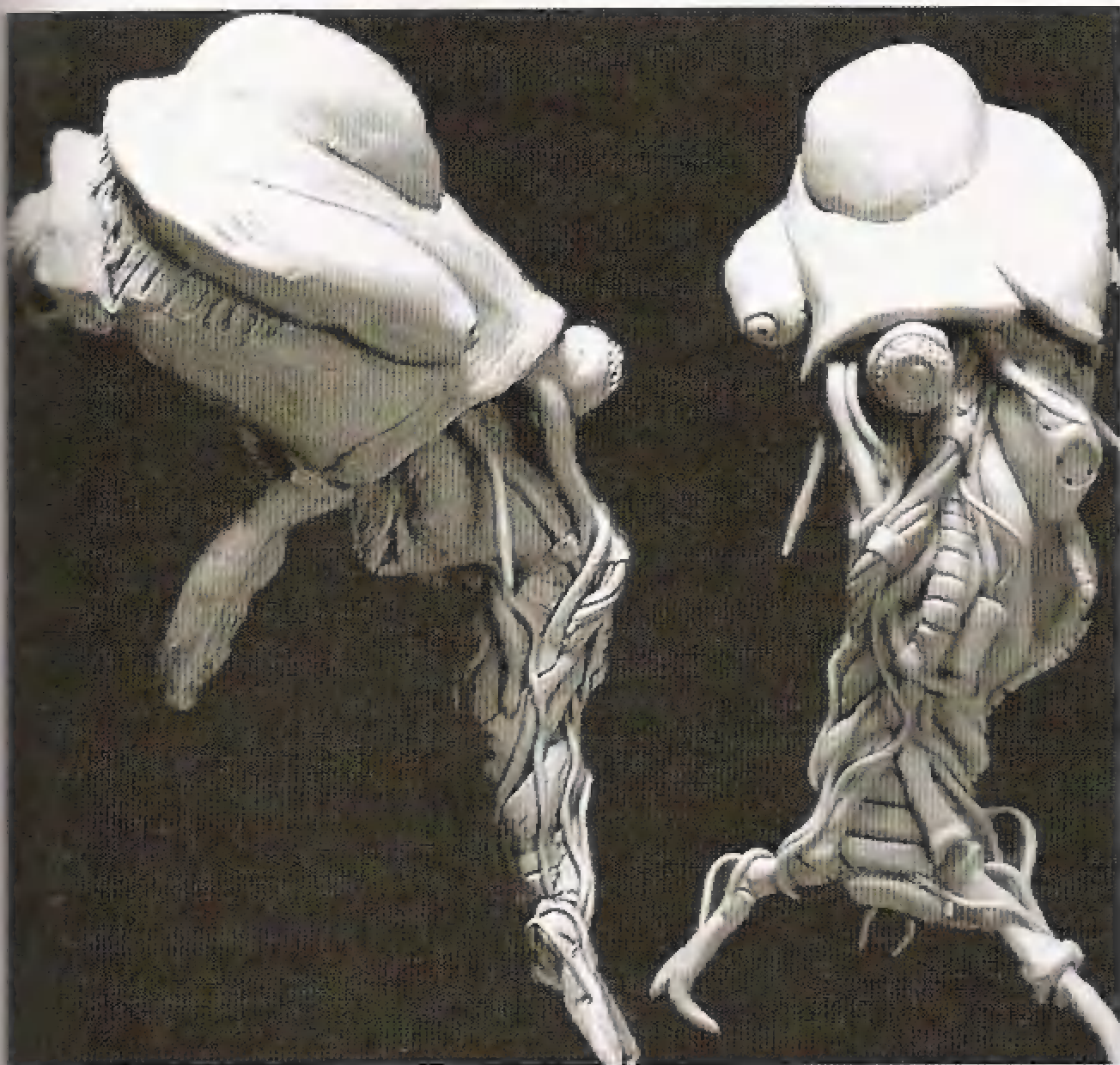
The Hydra

Ted Backman

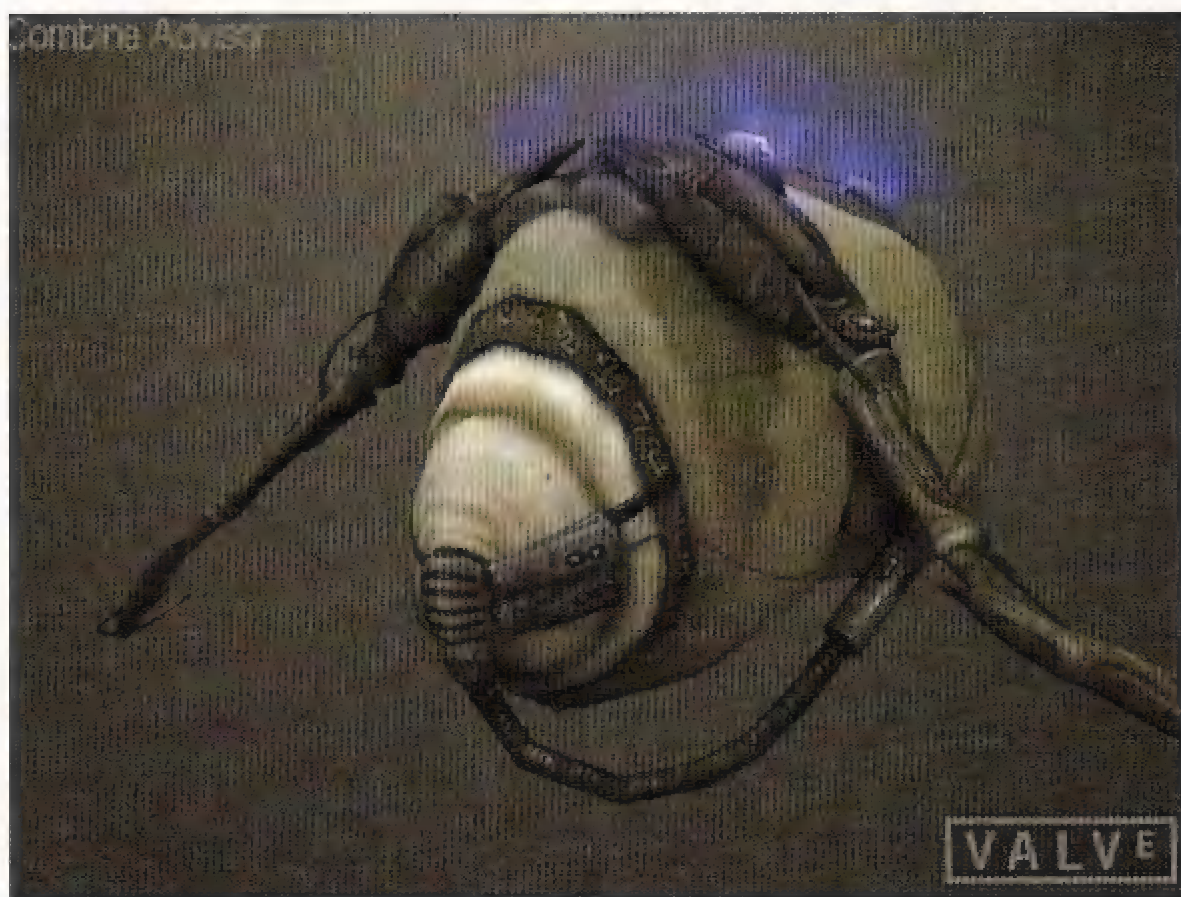
The Hydra was made of luminous gelatinous flesh, with organs clearly visible. The head was part of a larger, massive colonial organism.

"The Hydra was my pet feature, a monster I wanted in from the start. We designed whole areas of the game around it. I personally spent about six months on and off getting all the movement algorithms and physics to a working state. Everyone was pretty skeptical it was even possible when I started, so I kept it pretty low profile, but once I got some of the early rough AI drafts up and running people would sneak one into a map and check it out and get all excited and start pushing me to hurry up and finish it. However, the closer it got to being done, the more its fatal flaw was becoming clear: it was amazingly cool to watch it fight other characters, but it was zero fun to play against in first-person. When it attacked others, as the player you could see this great big glowing giant worm snaking through the map, knocking stuff over and putting on a great show, but when it attacked you, the player, you'd just see this non-descript blob doing something vague, then you'd be dead. Cutting it was personally very painful, but I had to do it; when a design just isn't working, it just isn't working. I'd still like to see this in the Half-Life universe somewhere, maybe rethink its AI more along the lines of an Antlion." - Ken Birdwell



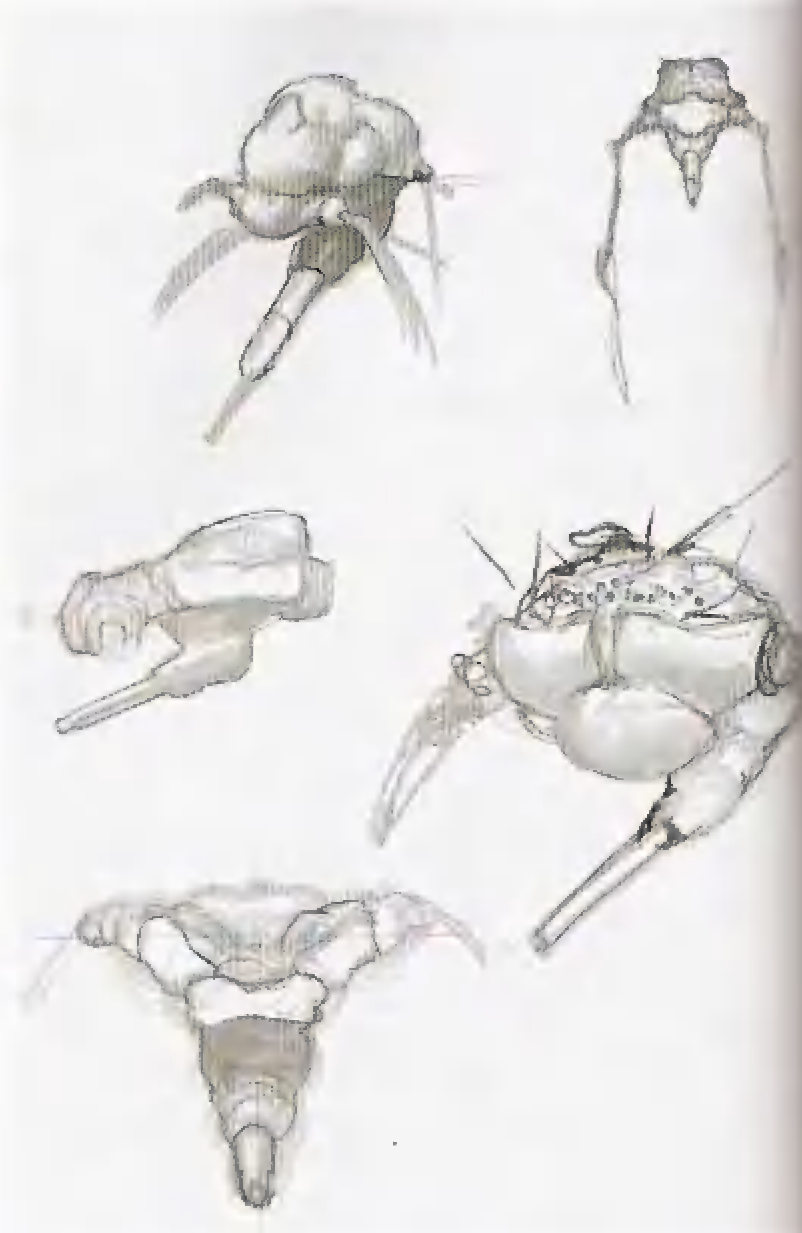
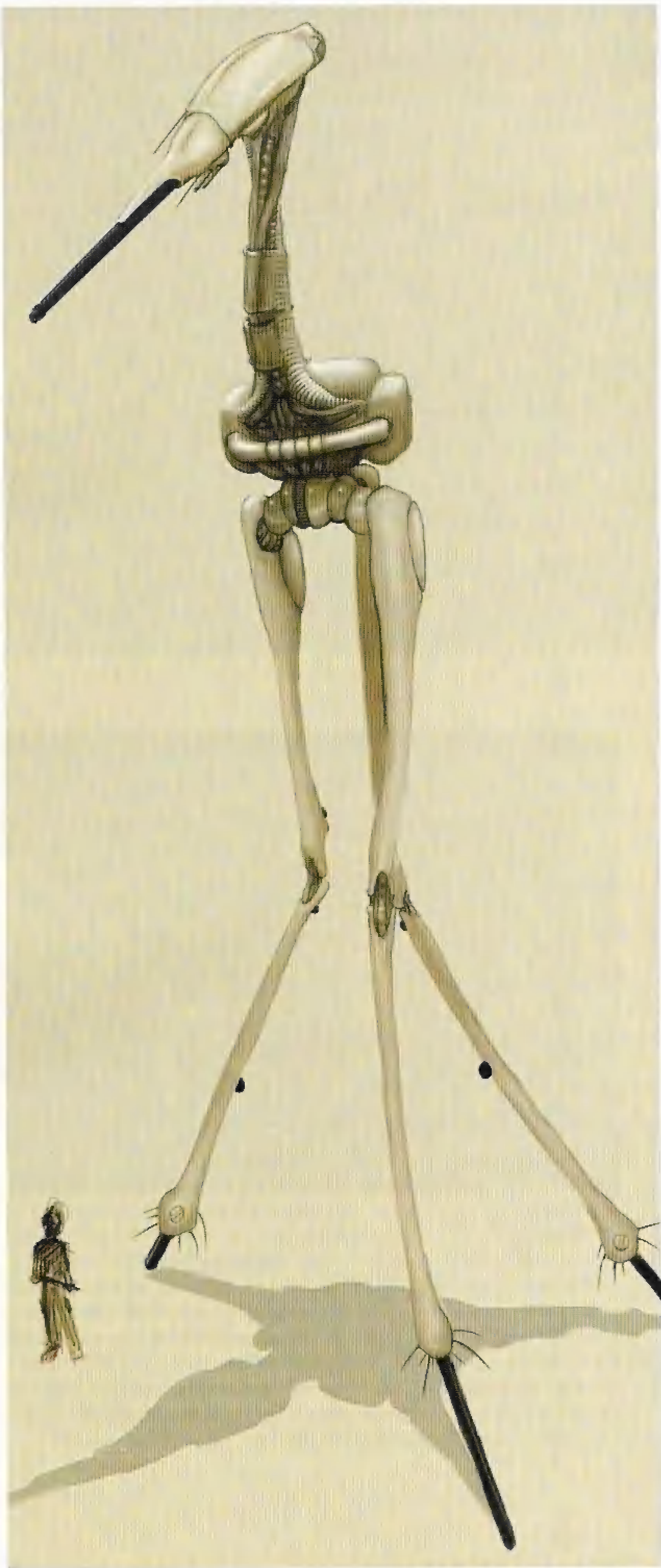


Field Scanner
Ted Backman



Combine Advisor
Ted Backman

"In designing this character we wanted to suppose that an organism, not unlike humans, began to depend on the technology that was originally created to improve its quality of life. Over the course of its evolution, it became grublike, with limbs no longer able to support its own weight, eyes too feeble to see without aid, a body now incapable of movement, fully dependent on the technology that it created. It was, however, incredibly evolved in its ability to reason, invent, and dominate the minds and cultures of other beings. This design was also in part inspired by the writings of Frank Herbert." - Ted Backman





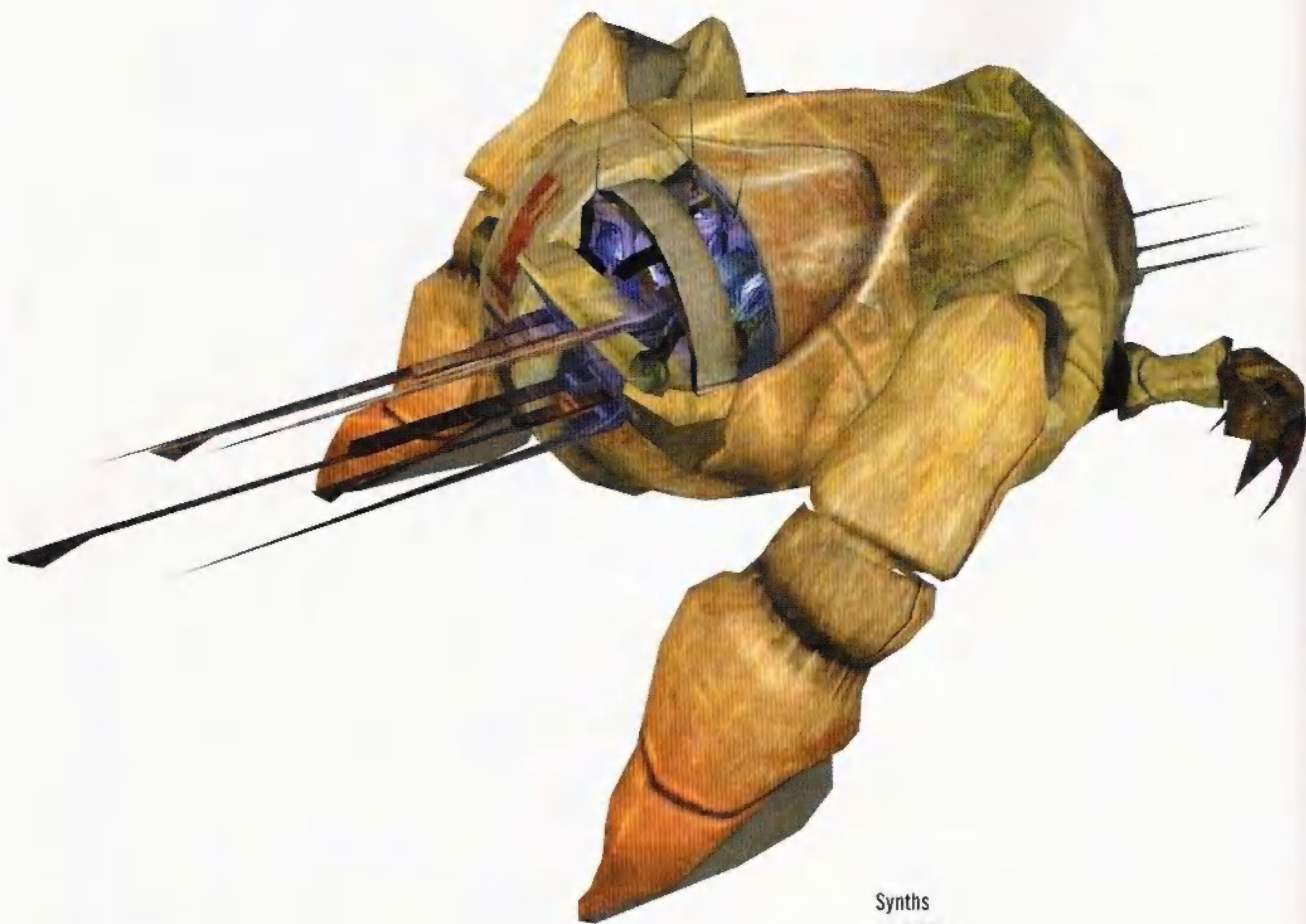
Strider
Ted Backman

The giant Combine Synth stalks the streets of City 17.

"As animation reference for the Strider, I used a giraffe/gorilla combo. I wanted him to capture the gracefulness of a giraffe, but also have the Strider stomp and lead with his elbows like a gorilla when he walks, to convey a simian power." - Bill Fletcher



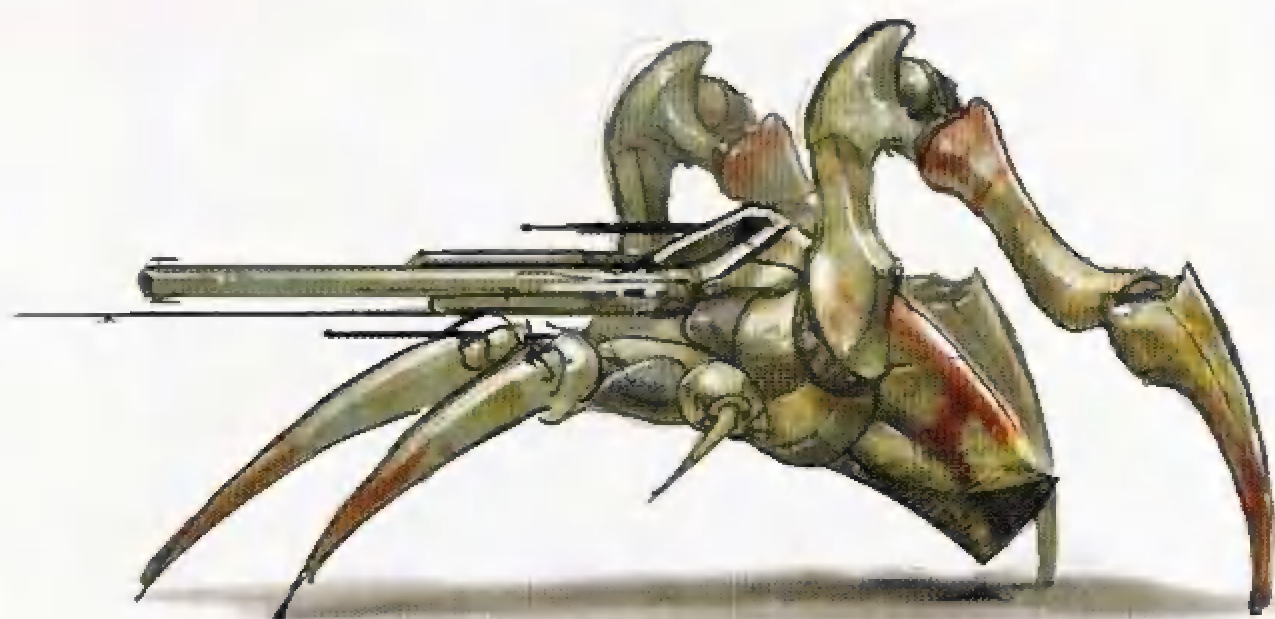




Synths

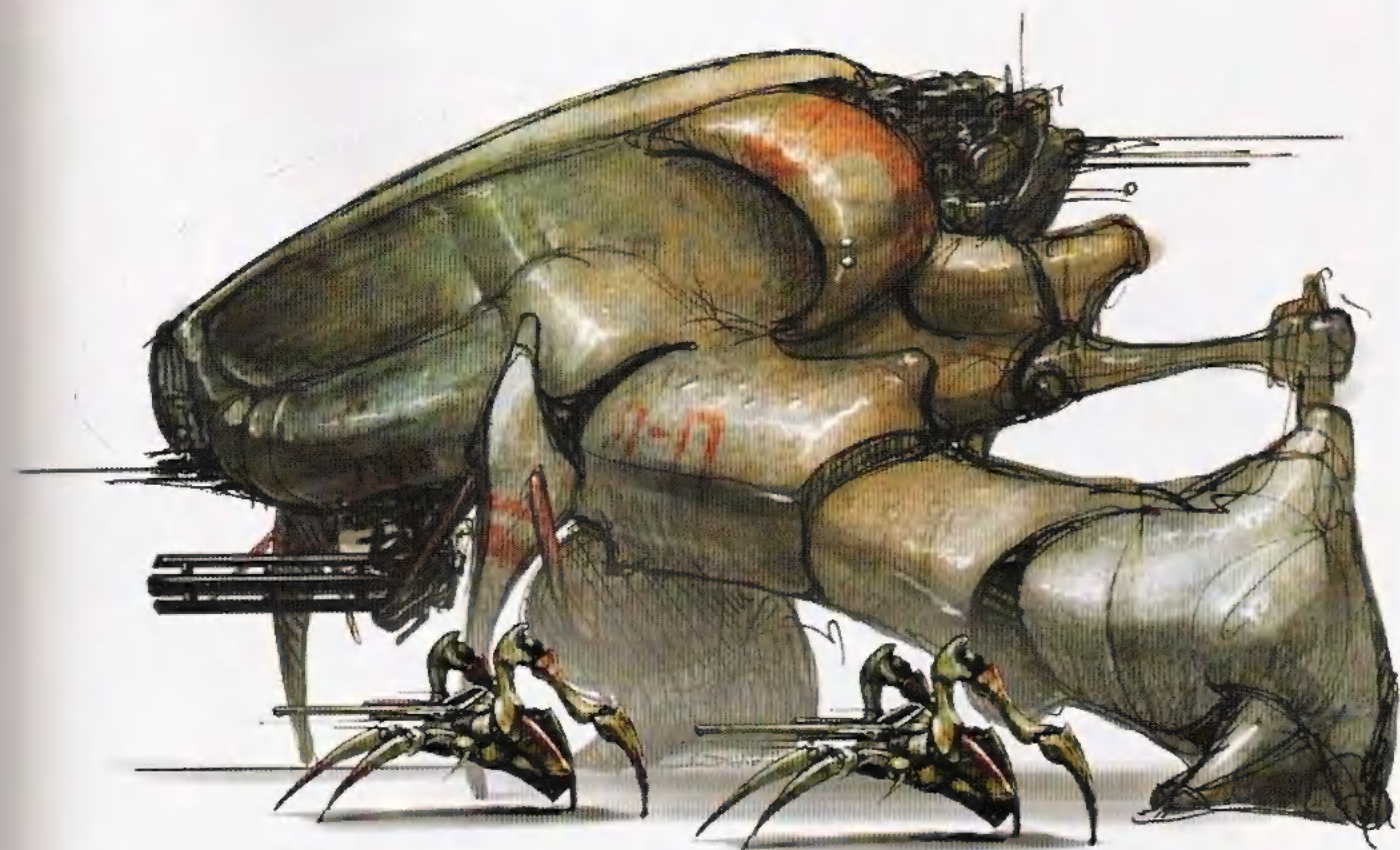
Dhabih Eng

The Synths, self-replicating robots that evolve, were created or taken over by the Combine and enslaved through their conquests and wars.



"When approaching the task of designing the Combine's larger creatures, it was necessary to keep in mind that these lumbering war machines were possibly once organic creatures that the Combine had enslaved and converted during previous invasions. Therefore we tried to incorporate elements that were neither strictly organic nor purely mechanical. We didn't want to have giant alien creatures with armor attached or implants added, but instead tried to treat it as a forceful evolution of the characters imposed on them by the Combine rather than nature. In the end, the designs intentionally blurred the line between machine and animal, in their appearance and more importantly their motion and how they reacted to the world around them."

- Dhabih Eng





Combine Helicopter

Tri Nguyen

This mid-point in the Helicopter design cycle had the Combine reinterpret human technology to fit their own sensibilities.



Buggy

The Buggy sound set was created from a library recording of a 1968 Camaro with stainless steel exhaust pipes and a highly tuned race engine.

"I was going for a citizen-tech look of cobbled together spare parts, adding together layers of wear and tear onto the model, so it looks like it's been through battle and repaired out in the field. It needed to communicate that the Combine has been around long enough that finding the perfect replacement wouldn't always be possible, but there's still lots of options and there's still a lot of creativity on the part of the citizens." - Tri Nguyen



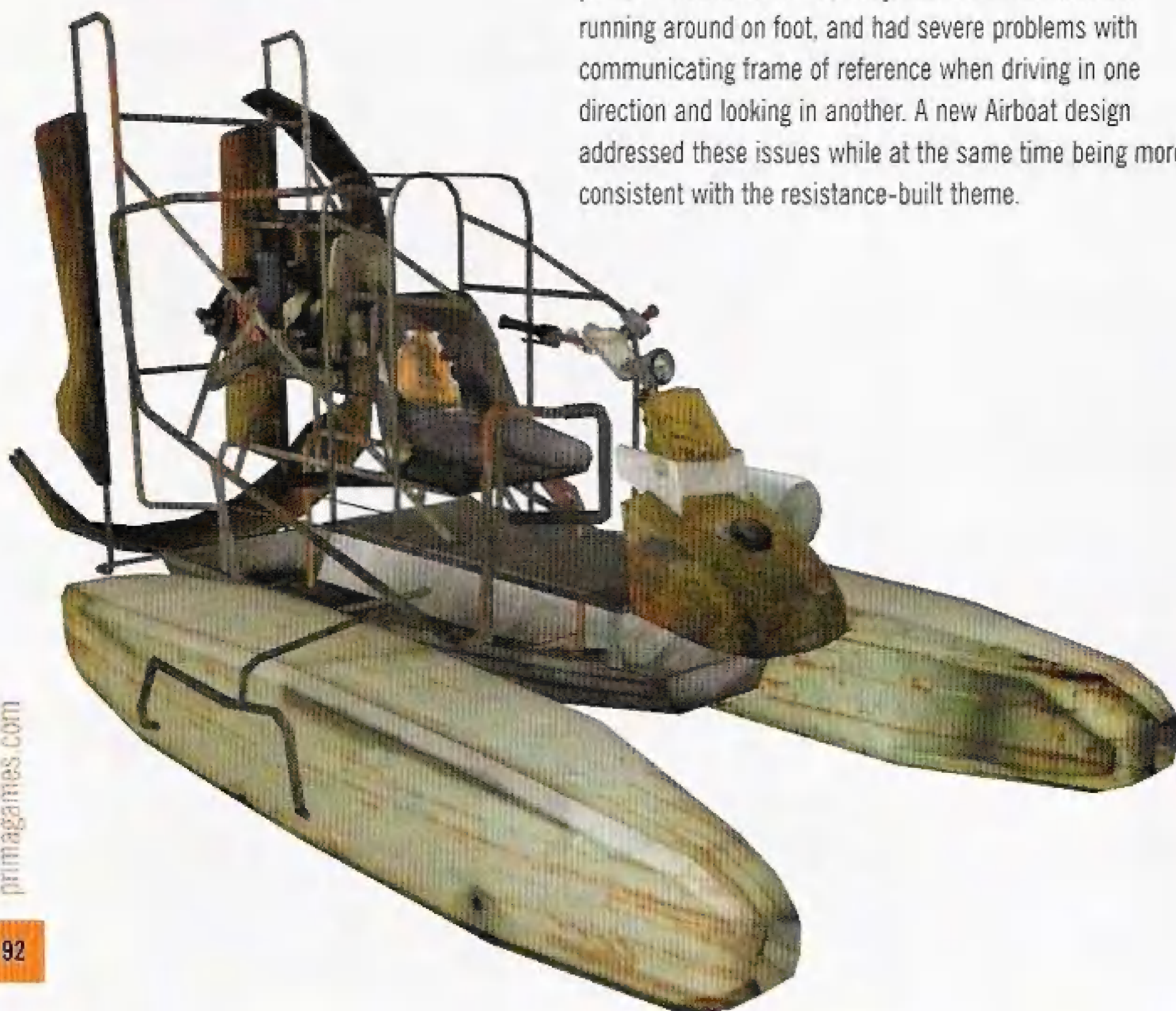
Jet Ski
Tri Nguyen

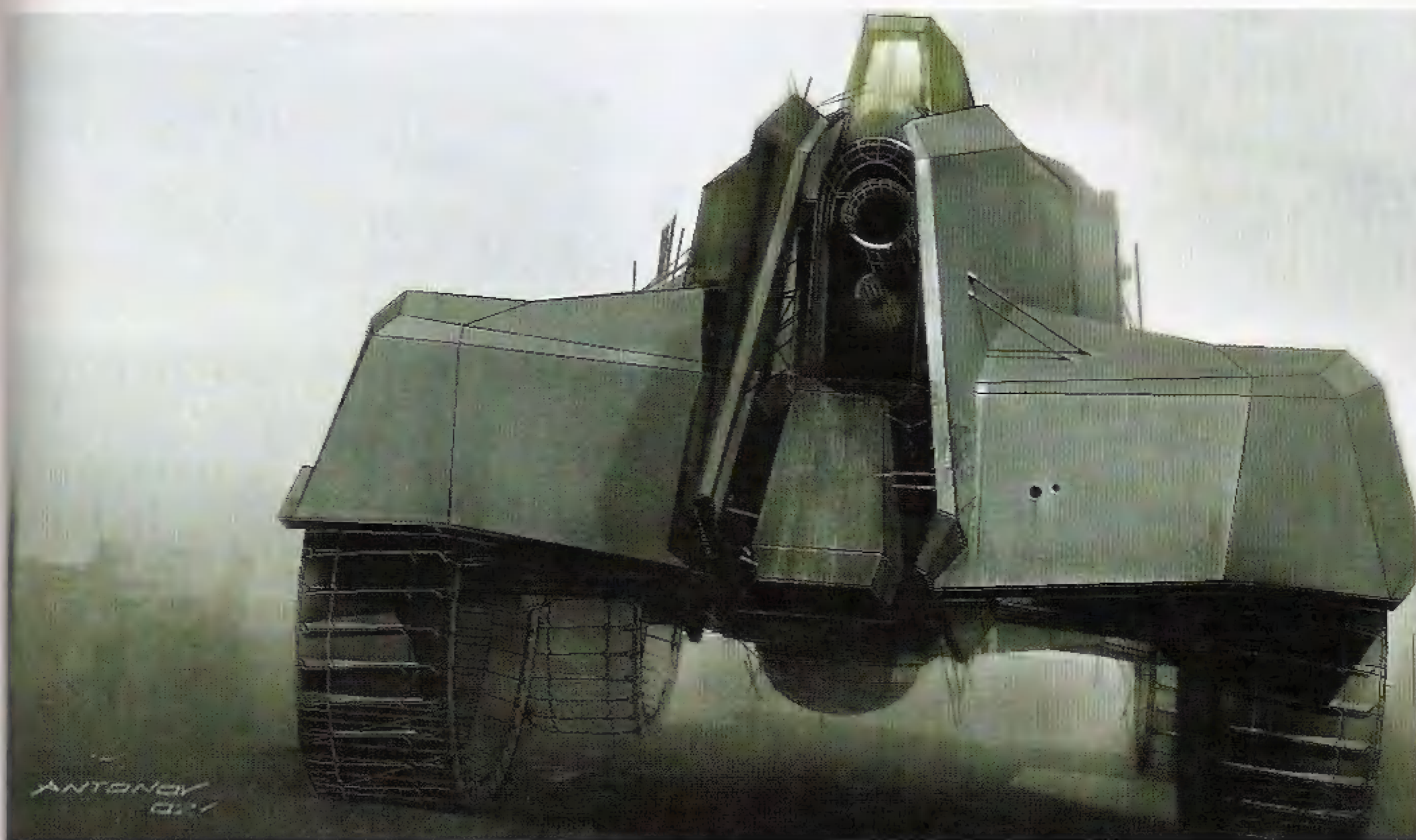
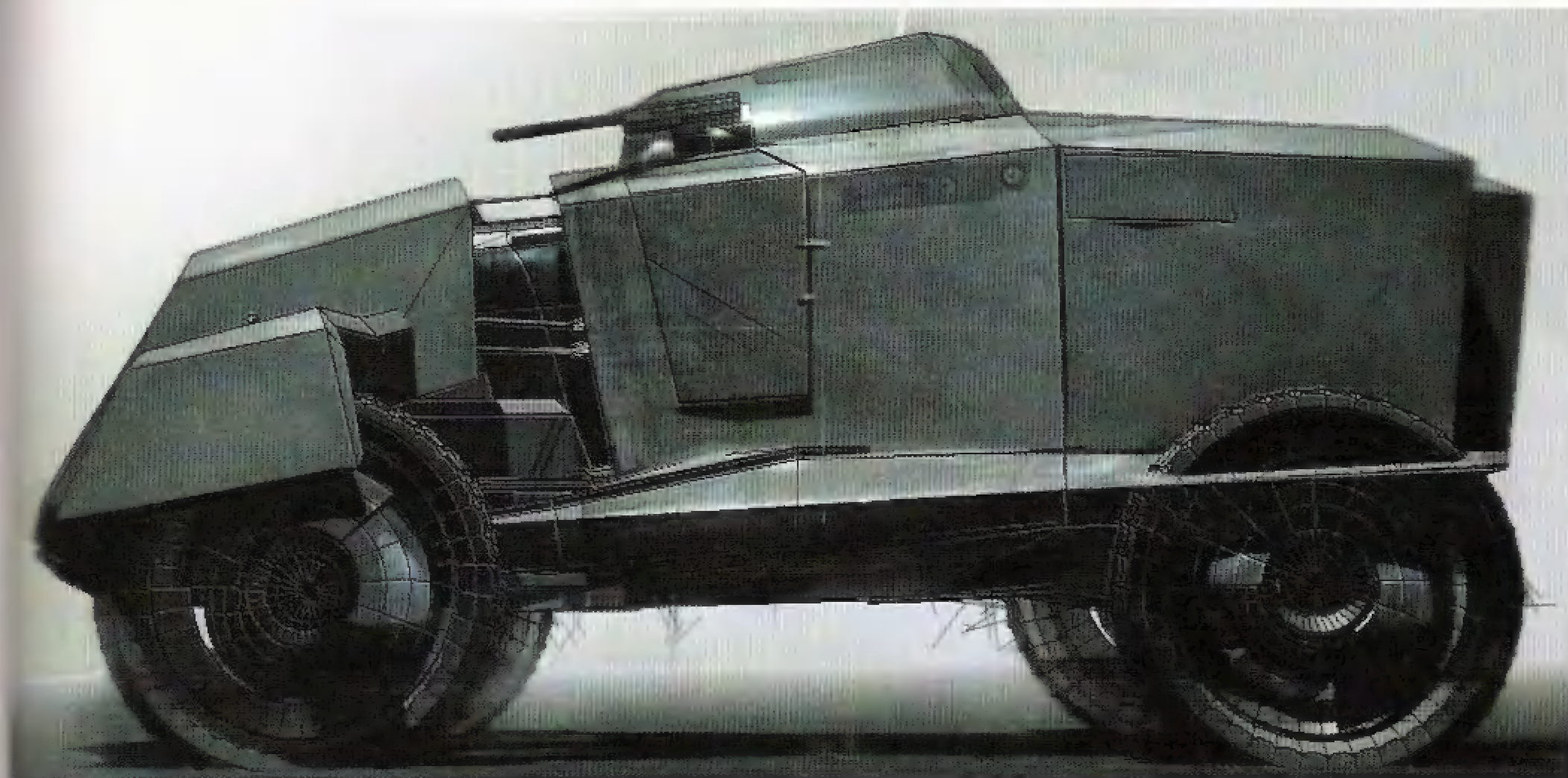


The Mudskipper (Airboat)

The Airboat, officially known as the “Mudskipper,” was originally a jet ski but did not playtest well. Keeping a first person view of the world, the jet ski was too much like running around on foot, and had severe problems with communicating frame of reference when driving in one direction and looking in another. A new Airboat design addressed these issues while at the same time being more consistent with the resistance-built theme.

“One of the major problems in developing the Airboat was motion sickness. If the player’s view was tightly connected to the Airboat, every slight bump was magnified, making some early playtesters nauseous—in particular programmer Adrian Finol, who actually threw up after an extended playtest. As a result, there was a careful redesign of handlebar, pontoon, and roll-cage visual cues. We made these adjustments until the happy day when Adrian declared an illness-free playtest.” - David Speyrer





Combine APC

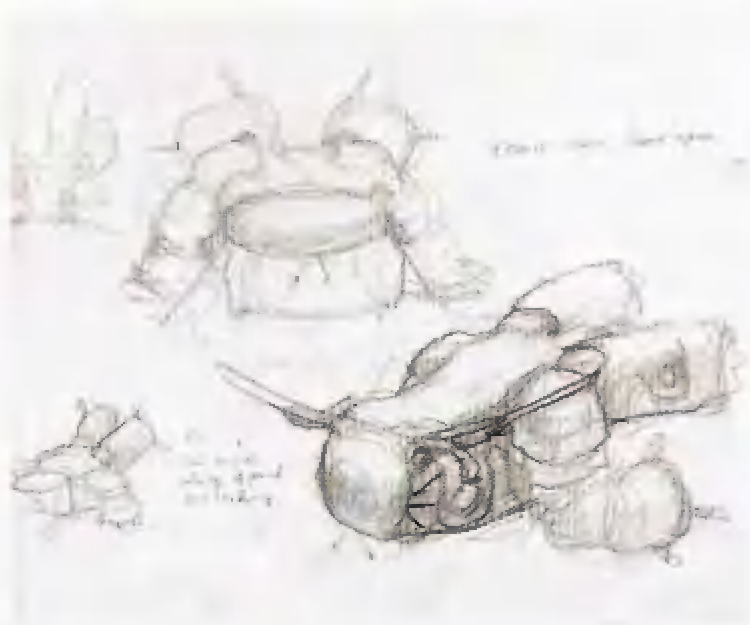
Viktor Antonov

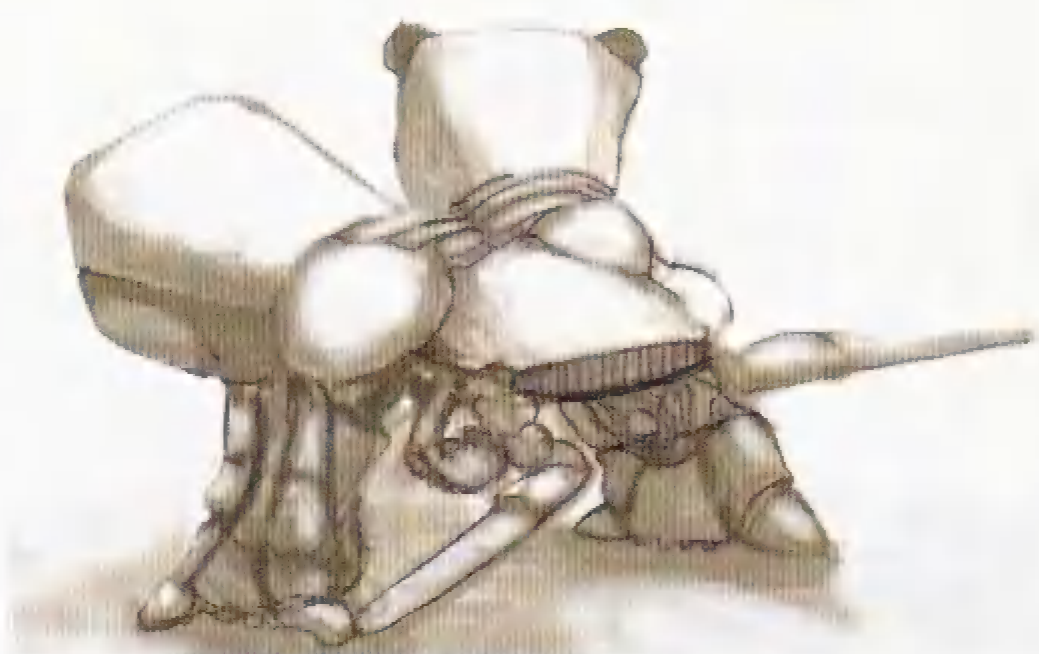
The APC was originally a player-driven vehicle. Playtesters found that the slow movement wasn't as satisfying as the Buggy, and the APC was recast and used by the Combine forces only.

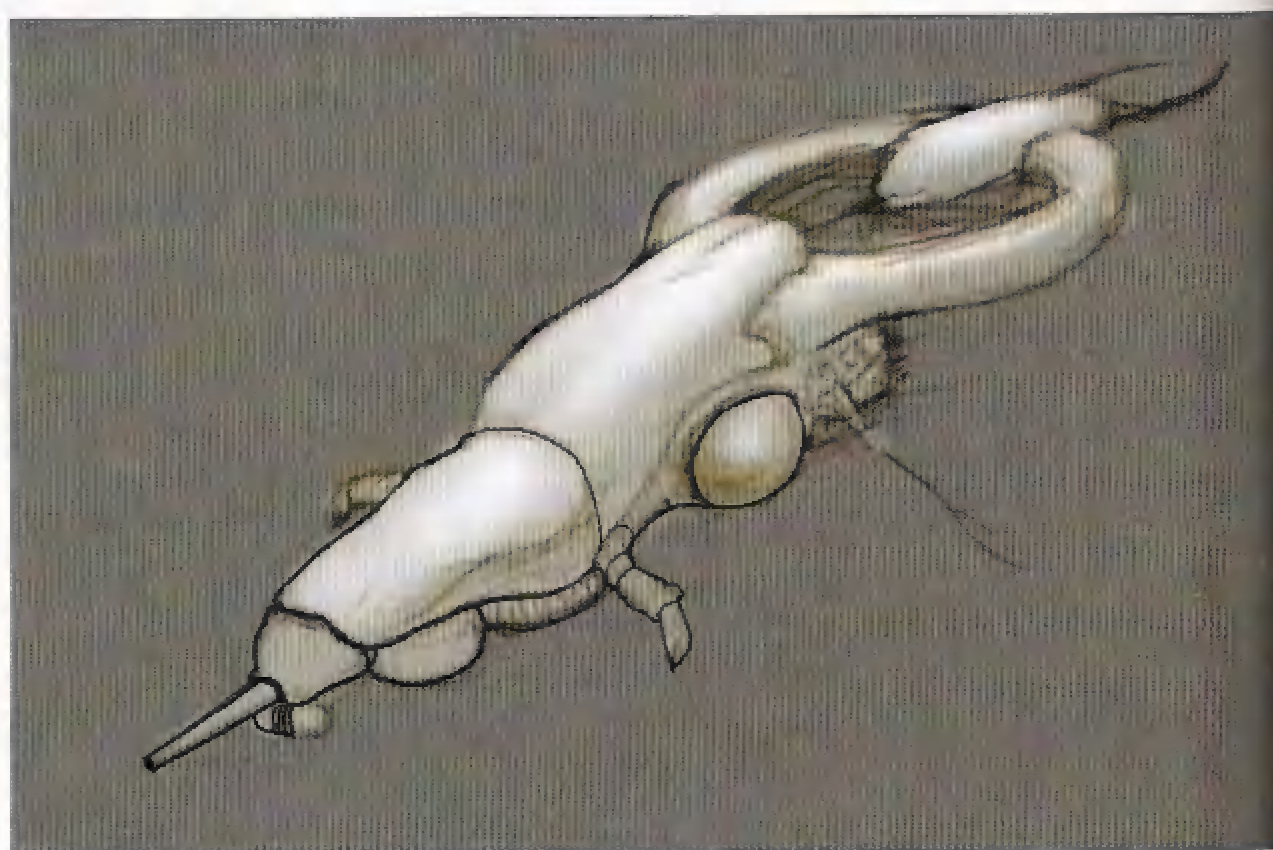
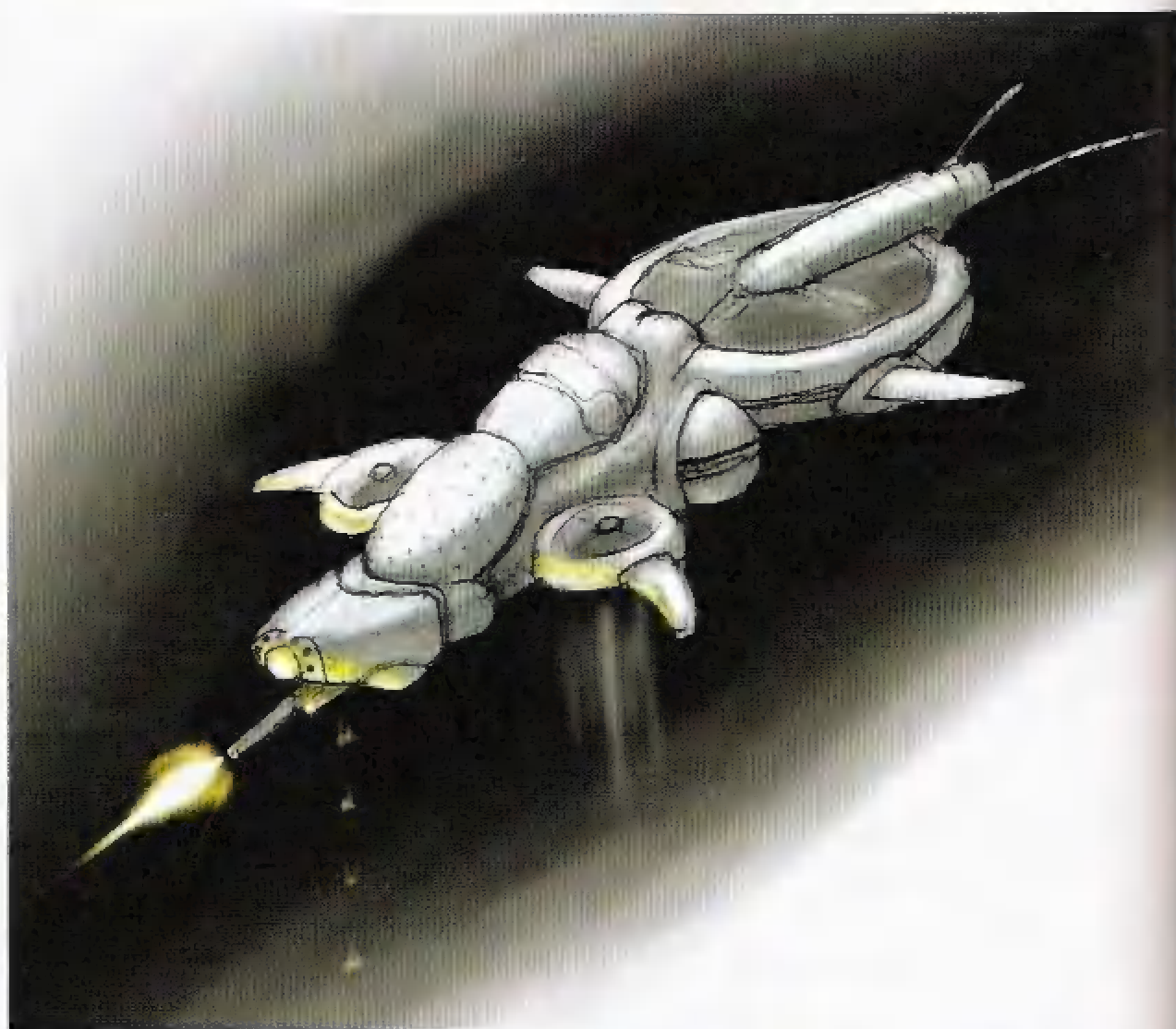
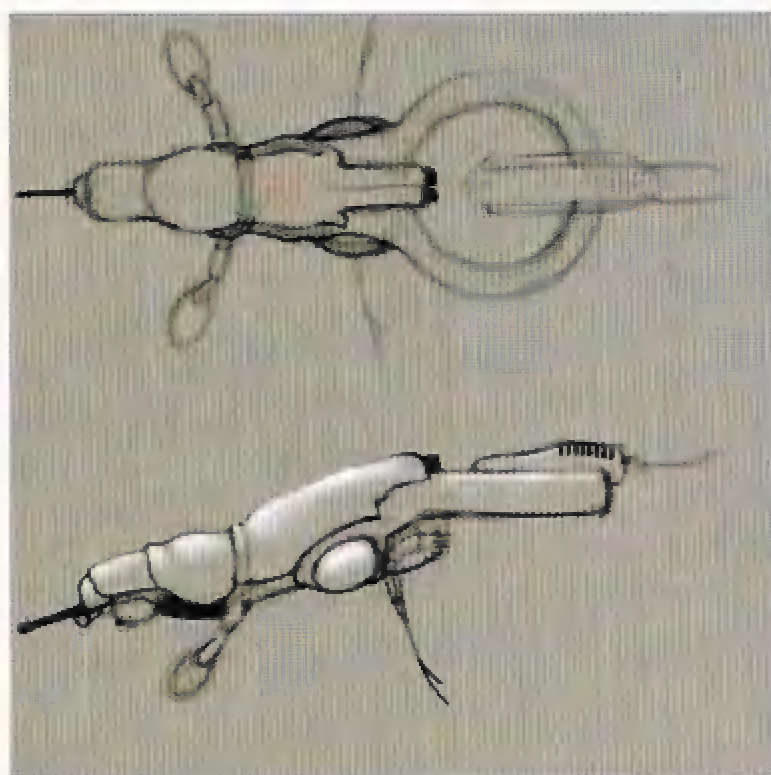


Combine Dropship
Ted Backman

The Dropship was originally designed to not only drop enemies, but to walk on land as a large crablike creature.

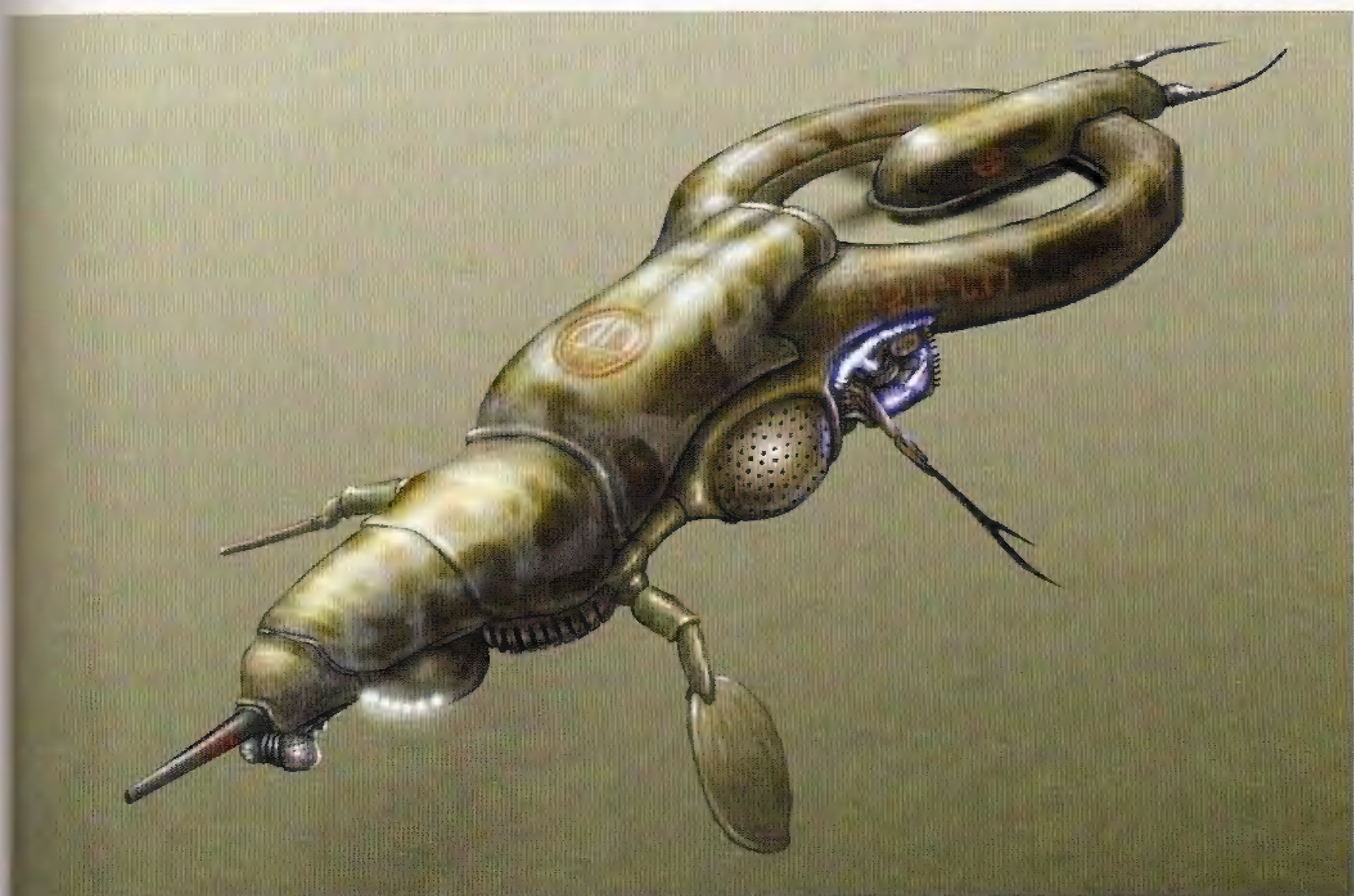






Combine Gunship
Ted Backman

While early Gunship concepts were quite machinelike, the final version shows a more ambiguous, synthetic look. During early playtesting, the team noticed that the Gunship would accidentally consider rockets fired at it as the more interesting enemy and try to shoot them down. This played so well that the RPG vs Gunship battles were reworked into a game of cat and mouse.



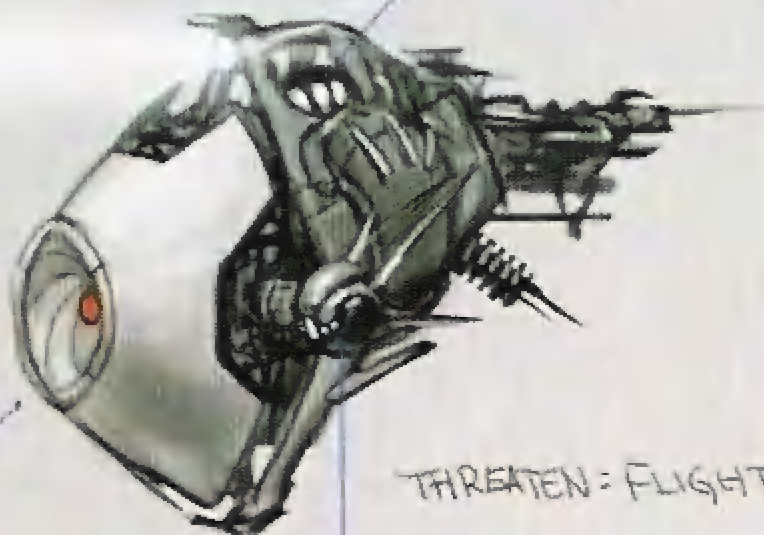


NORMAL: FLIGHT



NORMAL: HOVER

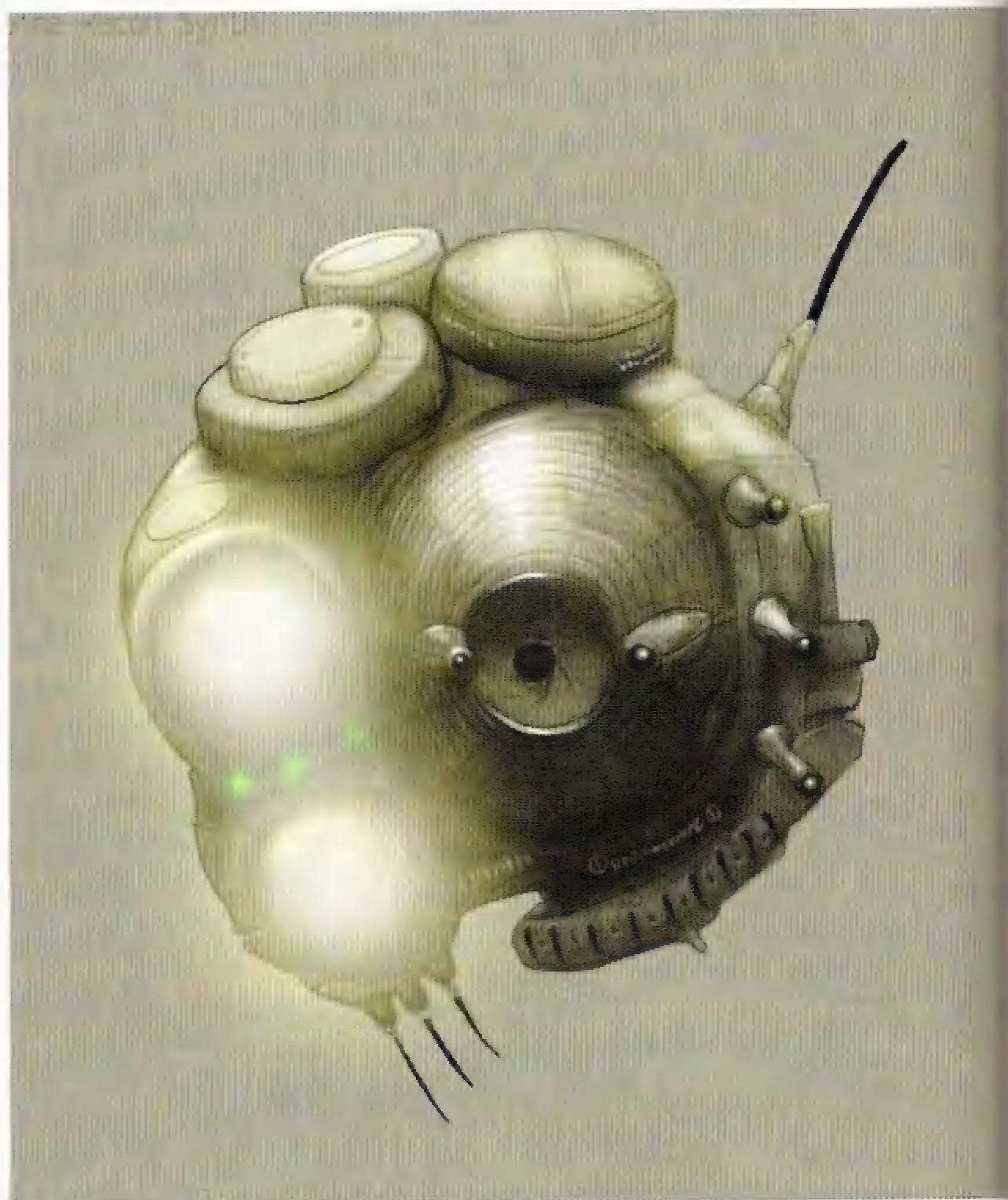
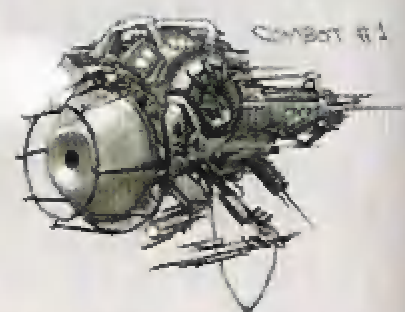
SPINNING
(BASED ON SPEED?)

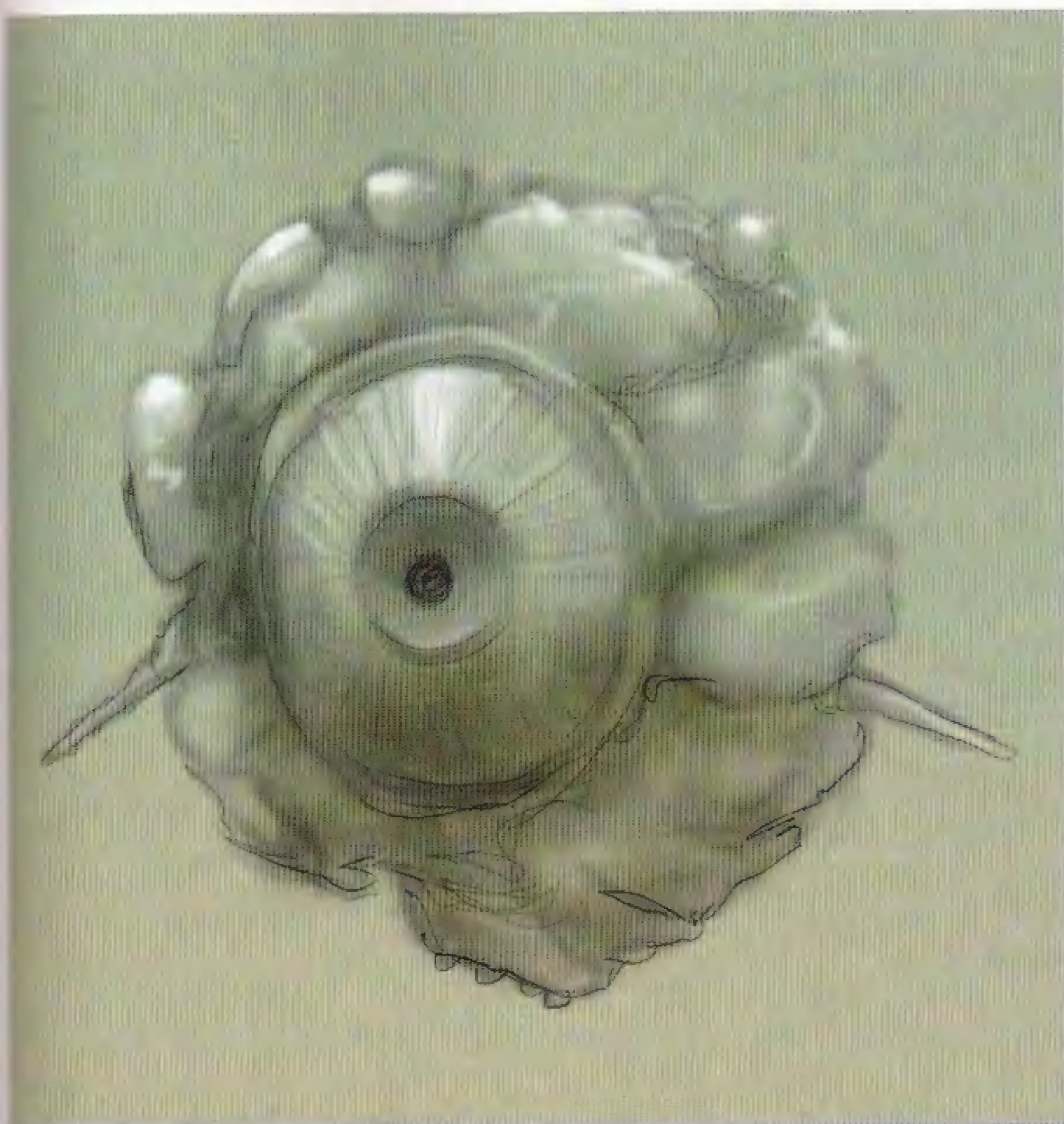


THREATEN: FLIGHT

IRIS SHRINKS WHEN PISSED

POPS OUT ON BOTH SIDES, SPOKES EXPAND
FIRES FROM THIS





Combine Scanner

Shabih Eng & Ted Backman

This Combine menace blinds the player while relaying his location to ground soldiers. The City Scanner design was initially modeled after the shape and movement of a cranha.





Antlion

Dhabih Eng

In coming up with a design for the Antlion, the main focus was to come up with an interesting configuration for the way the legs were set up. Valve artists chose this front-leg back/back-leg over design.

"The Antlions were some of the first creatures to be created and went through many augmentations and additions over the course of the project. They were heavily armored to begin with, but tearing them to bits with bullets was just too much fun, so we turned them into cannon fodder. Even without faces or dialogue, the Antlions were able to elicit a great deal of emotional attachment from players. Some people loved sending their Antlions to get mauled by the Combine, others would treat them like little pets, herding them around maps while grinning." - Josh Weier





The Antlion King
Ted Backman

"We knew our fans had grown up a little in between *HL1* and *HL2* and wanted to elicit a post-Mr. Friendly response. For the Antlion King design, we took one part solpugid head structure, one part duff, and sprinkled some warty growths on the top as a 'crown.' After the first character concepts for this guy were done, I made a three-foot long version in Roma Plastilina. (Unfortunately, this was my first attempt at sculpting freestanding characters in clay and the maquette eventually crumbled.) The Antlions were to have a patriarchal society, much like ants have a queen, but this was to be a creature even larger than the Strider. For a rough idea of scale, in the maquette, Gordon is stuck between the toes of the beast, which towered some 60 feet. During development, the topside Antlions started working, and more and more of the underground spaces were cut, until eventually there was no place left for the King." - Ted Backman



Low-poly Antlion in-game



Low-poly Antlion with normal map (bump map)



Low-poly Antlion lit with normal map

"Initially, we were having difficulty authoring bump mapping on our characters. We'd spend weeks and weeks doing it the traditional way of authoring low and high polygon models, only to get mediocre results. Toward the end of the project I ran into Bay Raitt at a meeting with Microsoft on the future of graphics. Bay had created the facial animation system for Gollum in *The Lord of the Rings* movie series and did digital sculpting on Gollum's head, and I told him that we were likely to cut bump mapping, which Bay and I thought would be a huge mistake. He volunteered to take one of our Antlion models and, using a tool called "ZBrush"—the same technique that they used on *The Lord of the Rings*—did a twenty-minute pass on it. The team loved it. Afterward, we reworked a large number of models in the game, adding bump mapping to them, including the faces for the main characters."

- Gary McTaggart

Antlion Guard

The Guard started life as a near-sighted bull. It could stick its nose into holes in the wall and look around for the player or charge the player and batter him with a clublike head. By lobbing small, noxious pods at you (which later turned into the Pheropods Gordon would employ himself) the Guard was able to flush the player out of hiding and into the open where he or she was vulnerable.



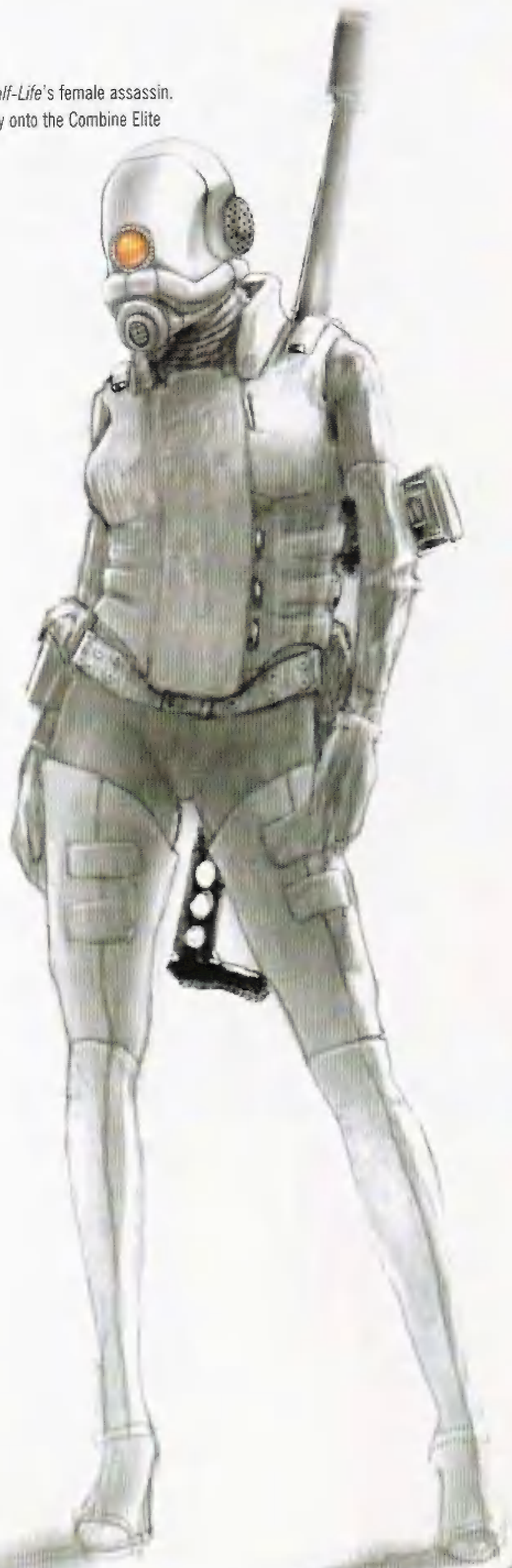
Fully-rendered, low-poly Antlion in engine





Combine Assassin
Ted Backman

Concept for the successor to *Half-Life*'s female assassin. The helmet design found its way onto the Combine Elite model.



Alien Assassin
Dhabih Eng

This Combine Alien Assassin known variously as the Breeder and Shock Trooper, was the original form of the Fast Zombie.



Combine Synth Elite Soldier
Ted Backman

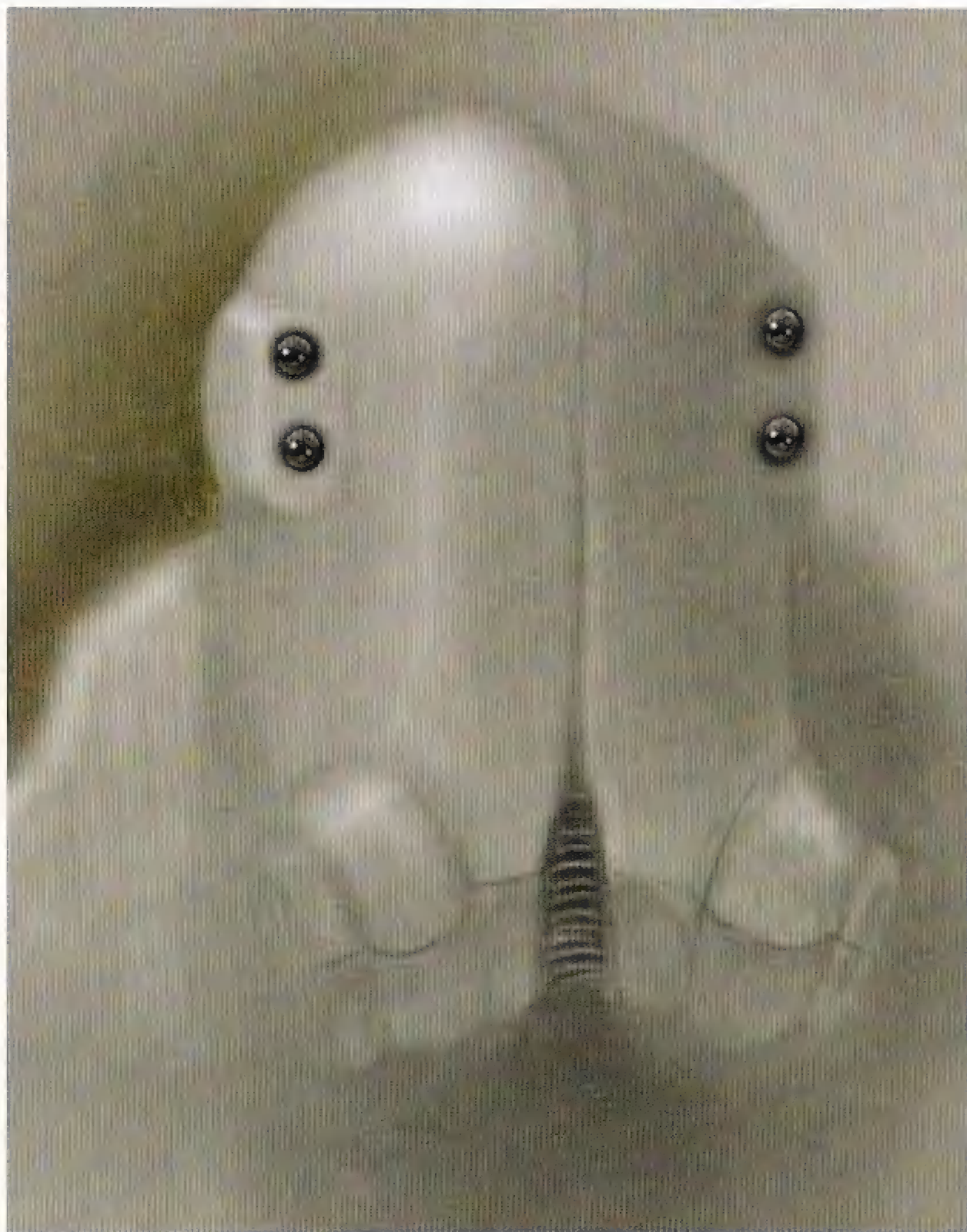
Various takes on a part-human, part Combine Synth Elite Soldier. The final design was a more conventional soldier with a helmet and uniform, similar to the Combine Soldiers.



Alien Combine Soldier Ted Backman

This very early version of the Combine Soldier moved like a snake or worm. Eventually it was decided to avoid any direct representation of human scale alien enemies and instead visually depict the Combine as a more transparent force.





Combine Helmet
Ted Backman

Early Combine helmet design was influenced by the work of Hayao Miyazaki.

Combine Sniper
Ted Backman

The Sniper was a supporting design to work in concert with a version of the Combine Elite.



I.A. Latham



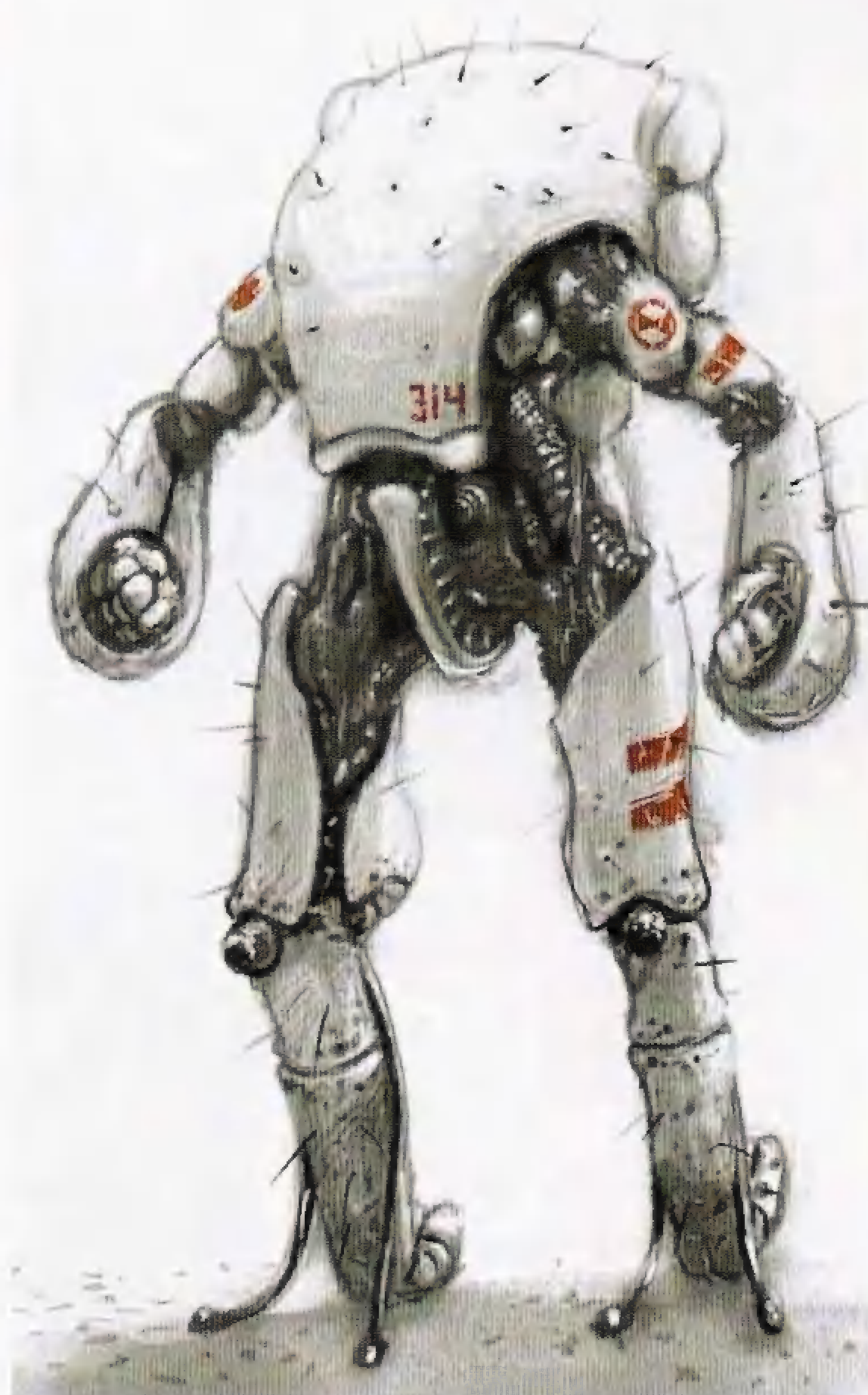
I.A. Latham
Ted Backman

A study for the female protagonist combat suit



Overwatch Soldier
Ted Backman

The Overwatch Soldier was to wear a smart camouflage suit. The color and pattern of the suit would change constantly to match its environment.



Combine Elite
Ted Backman

The Combine Elite was originally designed as an existing Combine creature, something akin to a small bipedal Strider, grafted onto the proportions of a human soldier. Problems with using an overtly alien model in the alien setting of the Citadel eventually caused it to be dropped in favor of a more humanoid model.



Elite Metro Cop

Combine Guard Dhabih Eng

The uniform for the Combine Guard was inspired in part by the German SS uniforms of World War II. Initial concepts had them wearing long trench coats. Once the Metro Cops were designed, a similar style helmet was derived for the Combine Soldier.





COMBINE SOLDIER

Combine Soldier

Ted Backman

"Combine is a term for the game's 'evil empire.' The Combine as an organism is successful because of its lack of specialization. It's something that no civilization has ever been able to adapt fast enough to resist, because it has so many arms, so many different attacks, and so many different species weaponized and co-opted for their strengths. As seen in the Metro Cops and Combine Soldiers, humanity is the latest species to be exploited for its negative traits."

- Marc Laidlaw





Combine Soldier
Ted Backman

Different insignia, helmet, and uniform treatments
for the Combine Soldier



Metro Cop

"The Metro Cops went through several sets of animations during their development. None felt right until we decided to give them a more bullying personality. I put a slight swagger in their walk, and made them lead with their chests more. They tend to do their talking with stun-batons, so we made sure that they always had one in their hands."

- Doug Wood



Combine Elite

Combine Soldiers

"If the Combine has access to infinite technology, what are their protective materials going to be like? Is it going to be like other games out there where they just have metal breastplates and shoulder pads? Is that high-tech? It seems to me like that is more like a low-tech approach to body armor. For the body, notice they don't have shoulder pads, which is something that everybody seems to love to put on soldiers in video games. I don't know why. I don't know if they think that soldiers will be tackling people. I always try to look at all the conventions out there and then figure out if there is a reason for them, or if it is just unnecessary baggage. In designing the costume, I wanted something that made sense and that could actually be plausible years down the road."

-Ted Backman









Half-Life 2: Digital Drama

.04

The enthusiastic response to the very few, very primitive dramatic scenes in *Half-Life* convinced Valve that developing the technology for better acting and animation should be a top priority in creating *Half-Life 2*. Whereas in *Half-Life*'s era, it was revolutionary for characters to simply move their mouths when they talked, more realistic and complex scenes were impossible given the set of tools and technology available at the time. As developers set to work on a powerful animation system, other designers couldn't help but dream up ambitious scenes, and a plot that depended on characters as much as on combat. Drawing on lessons of radio, stagecraft, and cinema, Valve's choreography team pushed the limits of in-game dramatics, hoping to hasten the day when "acting" in a game would no longer mean "horrible voiceovers."

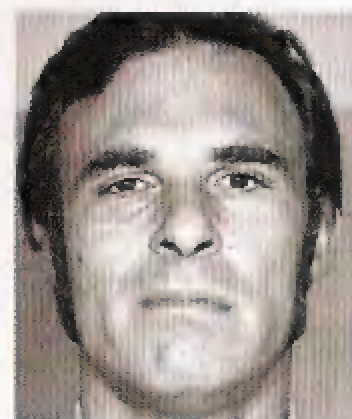
Valve knew early on that they wanted to spend a considerable investment in character facial expressions based on the relative success of the security guards and scientists in *Half-Life*.

"Once we had a plan for the art issues, we needed a way to do facial expressions. We looked at a lot of different methods; they were either really limited, really complicated, really expensive, or just really ugly. Sometimes, all of the above. Luckily we found a very simple method from outside of traditional computer graphics. In the early '70s a Dr. Paul Ekman was looking to see if he could diagnose mental illness based on facial expressions. Before he could start, he needed a way to describe what the patients were actually doing with their face, not in terms of a high level expression, but some sort of clinical grammar he could use to describe the underlying movements. What he came up with was a set of about 40 or so different 'Facial Action Units,' really simple things like 'raise your eyebrows,' 'pucker your lips,' 'drop your jaw,' 'flair your nostrils,' and so on. He wrote clinical descriptions of exactly what each looked like, and more importantly, the rules about how they all combined together. His goal was to have clinicians score the same facial expression with the same Facial Action Units, but it turns out that if you reverse this and build the rules into a computer-generated face, you can create a face that not only does the full range of human expressions, but it'll never do something that's physically impossible. This is critical for a game, where unlike a movie, if there's some flaw in the computer-generated character, the animators can catch and fix the problem before it ever makes it to the screen. But in a game, we regenerate the scene from scratch subtly different and adjusted to all sorts of external events each and every time you play, so it always has to make sense."

- Ken Birdwell



Anger



Contempt



Disgust



Happiness



Sadness



Surprise



Fear

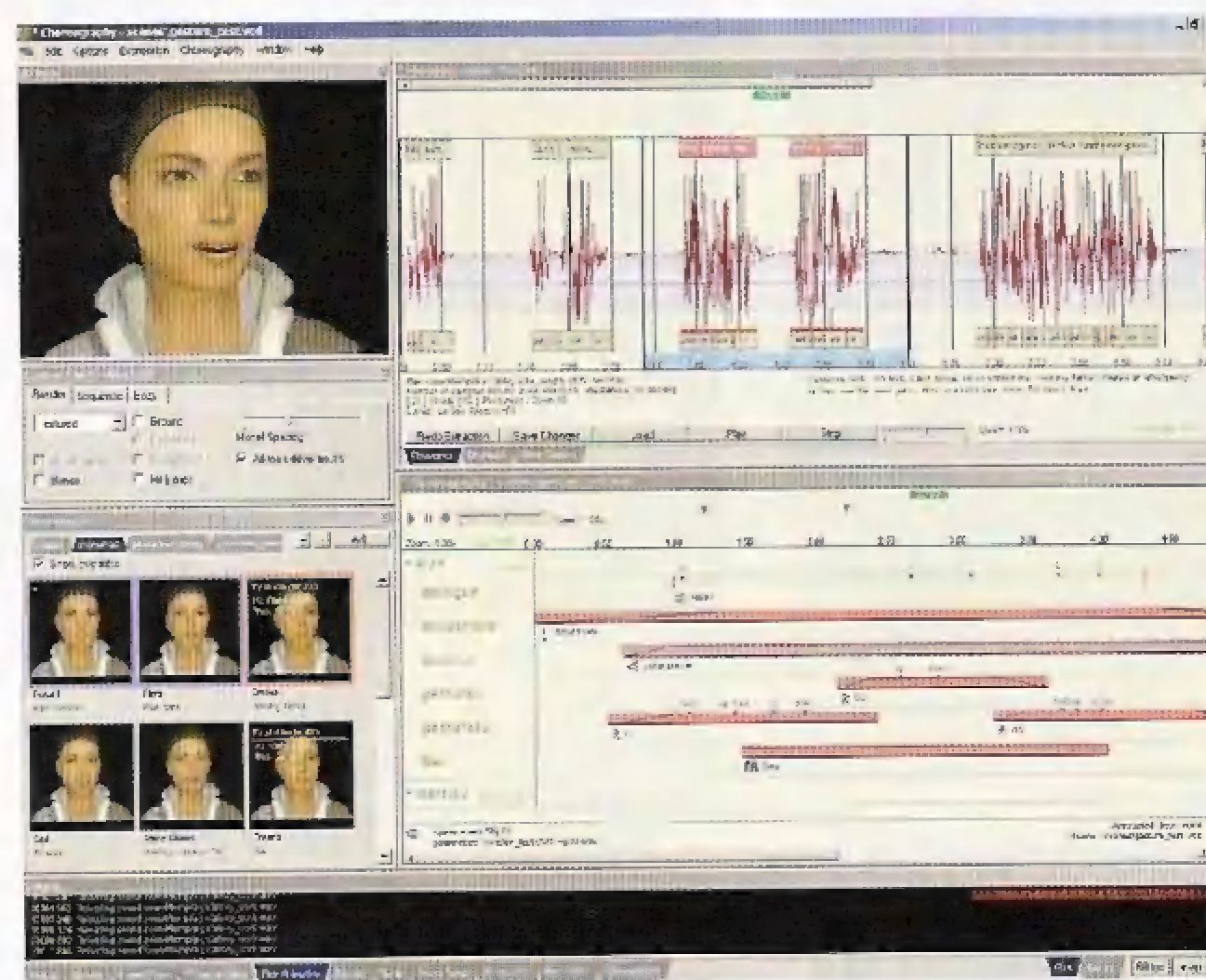
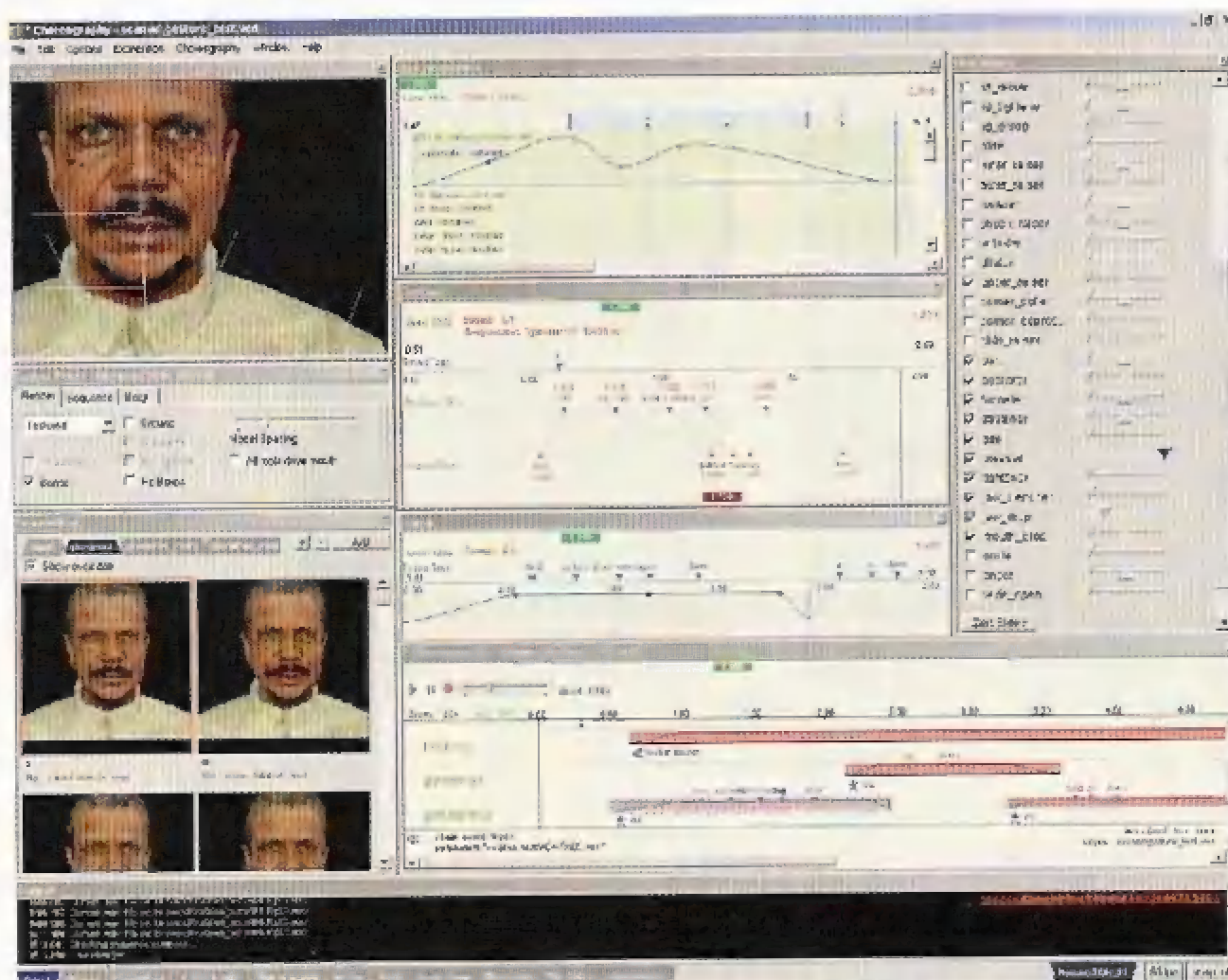


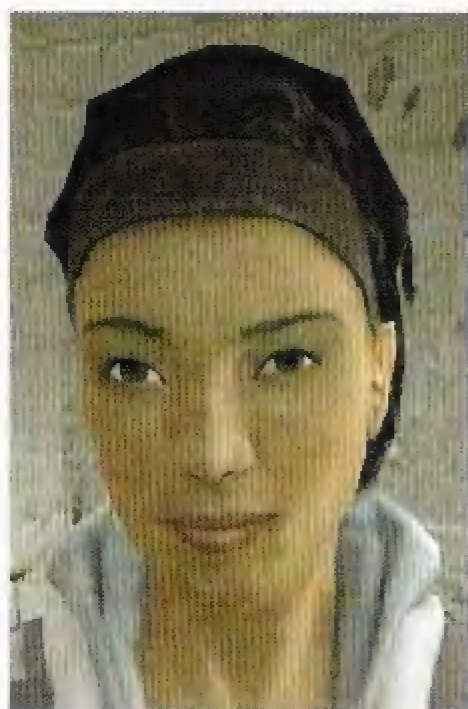
Faceposer

Valve's Faceposer tool in action (right). Faceposer allows animating not only of facial expressions, but also of body language, gestures, and stage directions for all the actors in a scene. All of these instructions are passed through the system so that the game can automatically adjust to changes in the game environment, as well as to actions of the player.

We knew that the only way we had a chance to complete the nearly three hours of character acting without an army of animators was by developing a library of gestures and postures that we could layer in Faceposer. We developed smart blending rules and influence ramps that enabled us to reuse our library of gestures and postures over and over again without appearing redundant. Each of our main characters had their own unique library which established their personality. Not only was it essential from a production standpoint, but it was a great way to keep continuity."

- Bill Fletcher





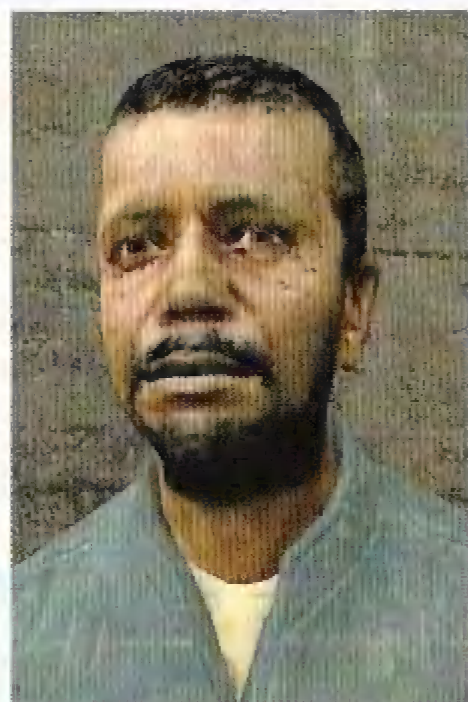
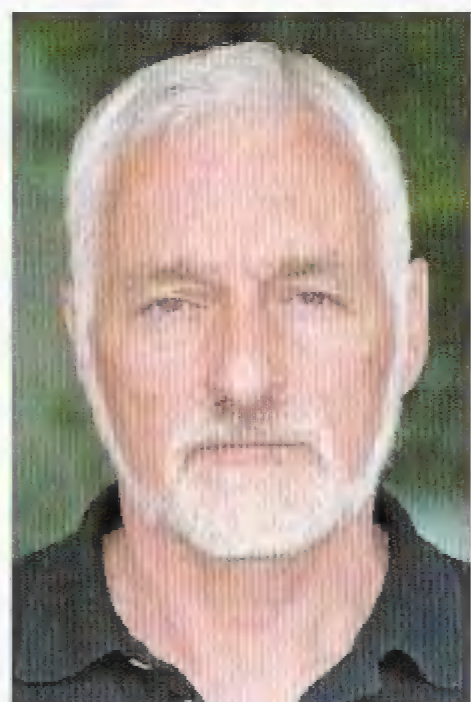
Alyx Vance



Barney Calhoun



Doctor Wallace Breen



Repatriated Citizen

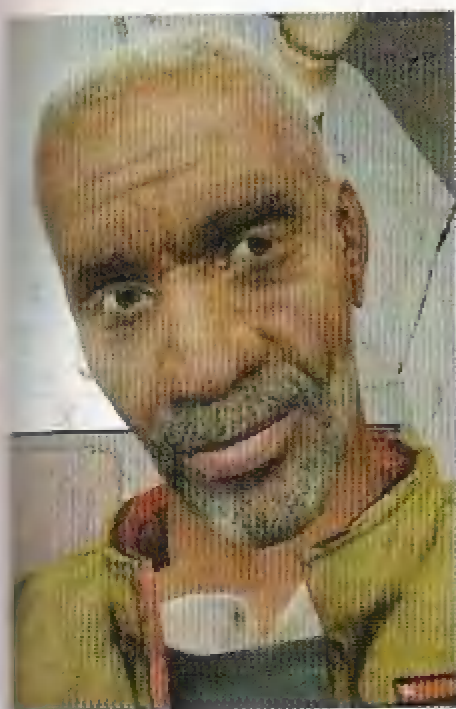


Resistance Citizen

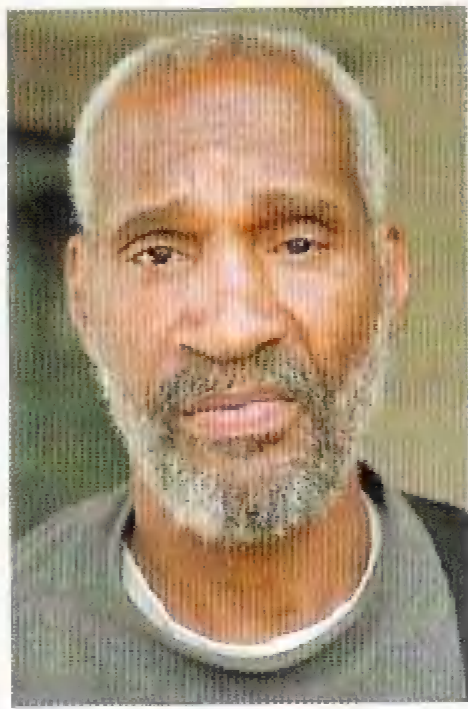


Resistance Citizen





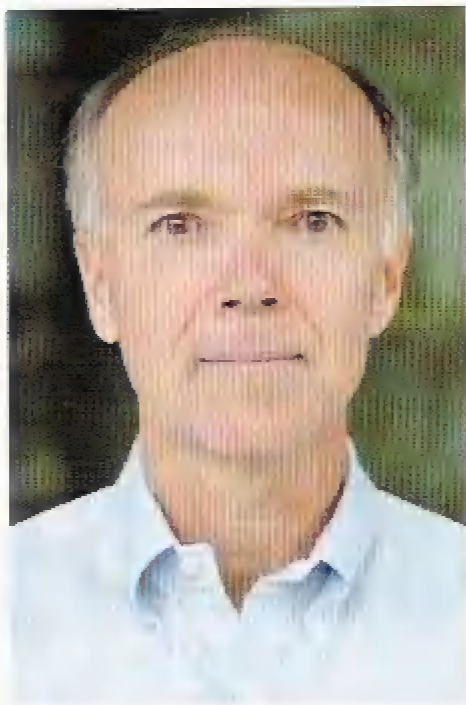
Doctor Eli Vance



Father Grigori



Professor Isaac Kleiner



Doctor Judith Mossman



Colonel Odessa Cabbage



Half-Life 2 Model Reference

When casting character faces, Valve artists searched for people with striking looks. Dr. Kleiner turned out to be an accountant that worked in the firm above Valve's office. Eli was holding a sign and looking for work on the street. Father Grigori was the father of one of the modelers. Cabbage was a team member's martial arts teacher. Barney's face is that of Valve's COO. The team did have some trouble finding a diversity of female faces, however, and ended up posting an ad in the classifieds of the Seattle Times: "Your Face in a Game!"



Doctor Isaac Kleiner

An early model version (left) and final model with hands folded (below). Doctor Kleiner is a Black Mesa survivor brought forward in order to fill out the remaining science team of Eli Vance and Judith Mossman.

"We thought we had Dr. Kleiner's model in the bag, until we laid eyes on Ted Cohrt. We were in the elevator with him and we said, 'Oh my god, that's Doctor Kleiner!' We spoke with him and he was happy to let us use his face, as his two teenage boys were both *Half-Life* fans. It was always fun to run into him at Starbucks with team members that didn't know where we got Kleiner's face. They'd just start staring at him, trying to figure out why he looked so familiar."
- Bill Van Buren

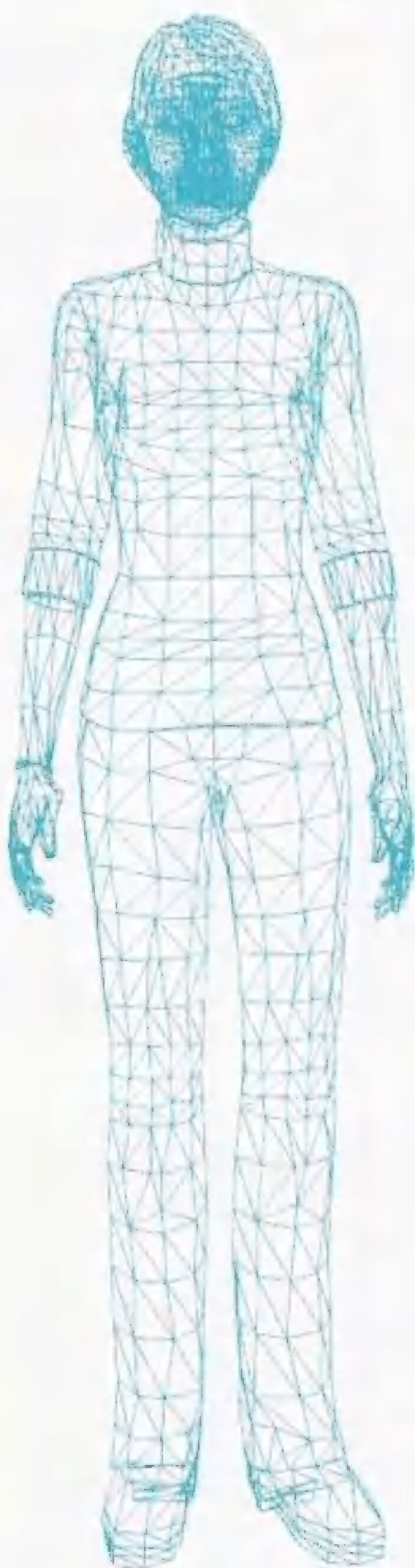


Lamarr

Kleiner's pet Headcrab is named after the 1930s Hollywood legend Hedy Lamarr, who juggled acting and the co-invention of "frequency hopping," a core technology used in modern cellphones.

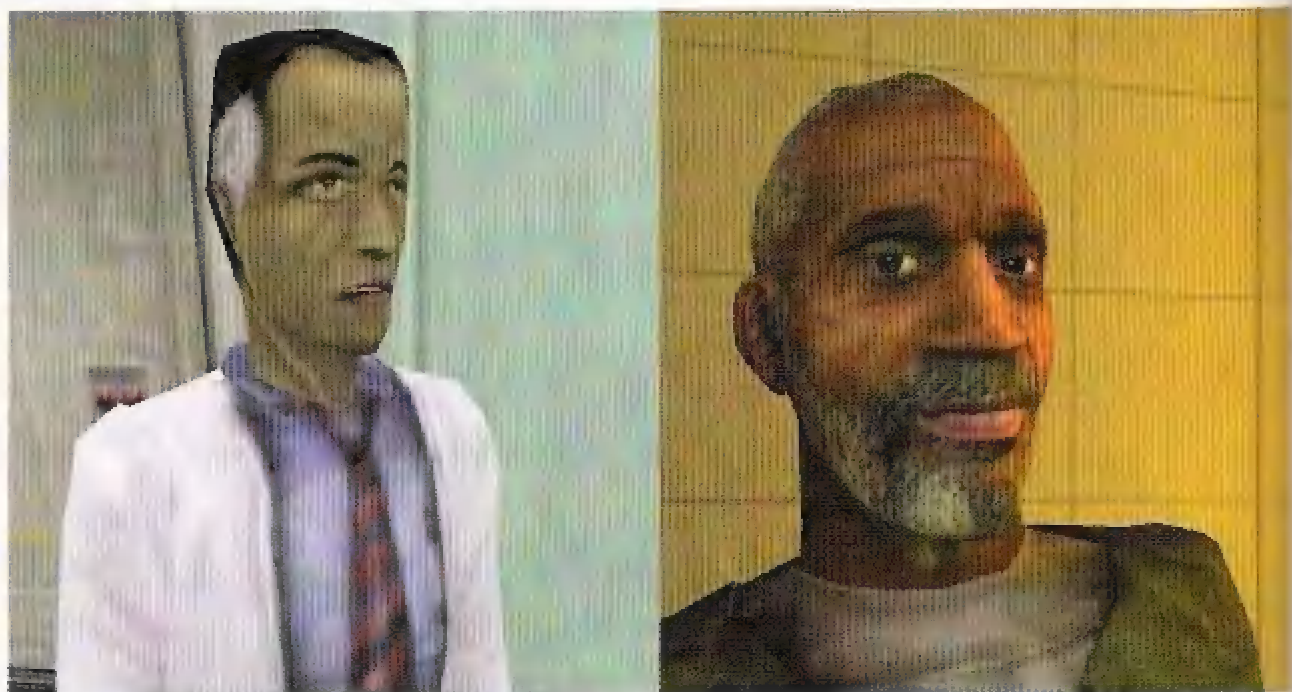
Doctor Judith Mossman

This initial version of Doctor Mossman reinforced the decision that *Half-Life 2* characters would all have short or constrained hair—the alternative to what Valve artists call “helmet hair.” Additionally, as the team started working with Michelle Forbes in the voice sessions, Mossman became increasingly more sympathetic and nuanced, moving farther from the personality type for whom this model was originally designed.



One of the first goals Valve set for itself was converting some key *Half-Life* characters into the higher resolution and more naturalistic models that they wanted for *Half-Life 2*. Once the look was established, technology was developed so they could be rendered on a wide variety of hardware.

"I remember in late 2000, when I first interviewed at Valve, I took one look at an early version of Alyx and knew that this was the future of games and I wanted to be a part of it. We went from the simple iconic scientist of *HL1* to the very realistically modeled characters in *HL2* with full facial systems and complex animation libraries. An immense amount of detail went into making our characters come alive—from the realistic procedural eye movement, to the very responsive AI system." - Bill Fletcher





The Vortigaunts

Vortigaunts are a hive-minded, energy-wielding slave race, inadvertently liberated by Gordon Freeman when he destroyed the Nihilanth in the final battle of the Black Mesa Incident. Rather than fall under the dominion of the Combine, those Vortigaunts now stranded on Earth have joined with humans to fight for the freedom of all.



Barney Calhoun

Barney is the stalwart former Black Mesa security guard working undercover as an officer for the Civil Protection Unit of City 17. Cognizant of the fact that he still owes Gordon a beer, Barney is a worthy ally in *Half-Life 2*.



Father Grigori

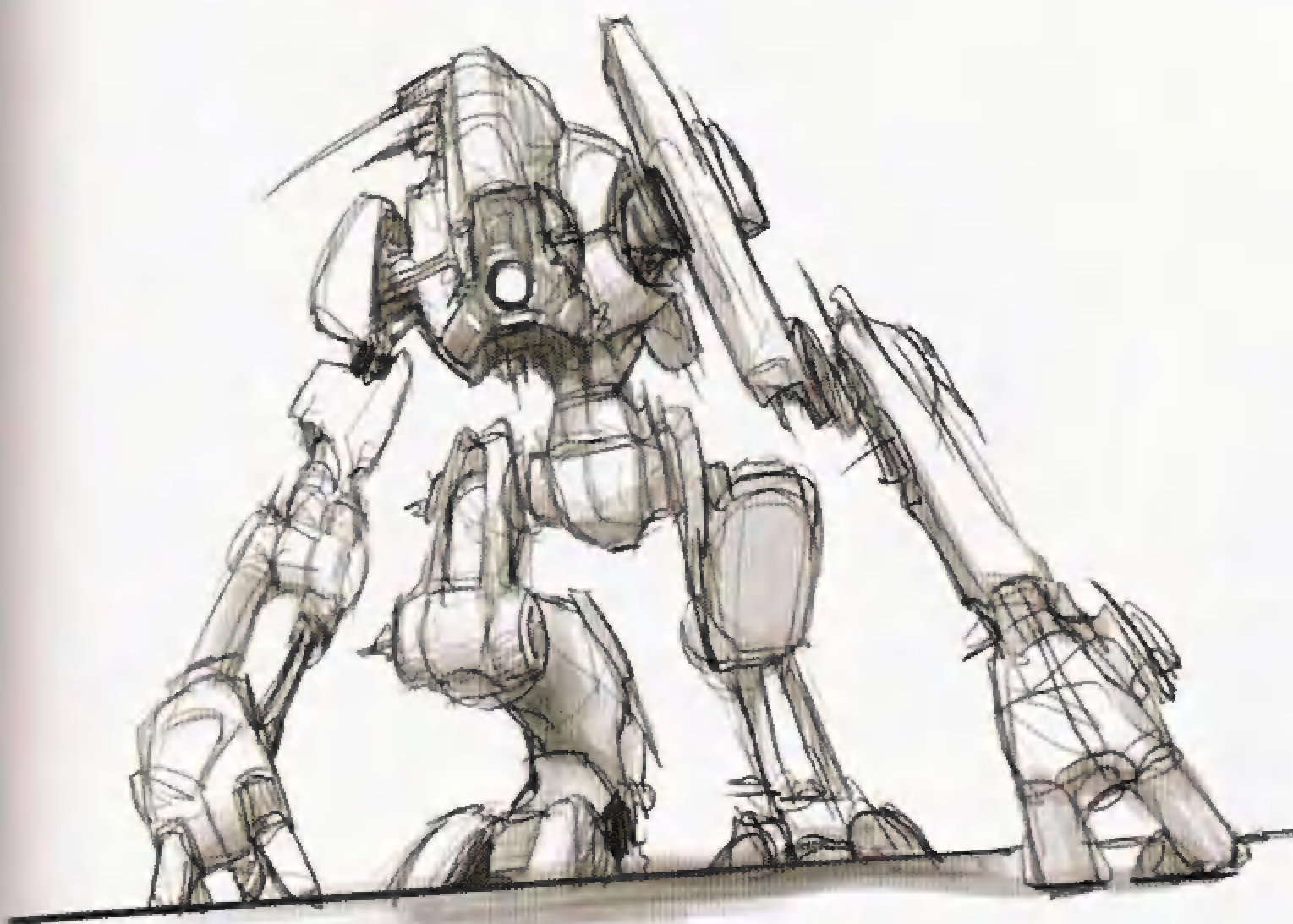
The "mad monk" of Ravenholm did his best to minister to its citizens throughout the Combine invasion and occupation, but in the end his entire congregation has found a new form of resurrection. Having littered Ravenholm with incendiary traps and gas-powered guillotines, he meets the enemy with a mad laugh and a blaze of shotgun fire.



Colonel Odessa Cubbage

The model for Colonel Odessa Cubbage (right), blustery commander of a seaside rebel band, originally was intended for a *HL2* character known as Odell (above right). Odell was the engineer of an ice-locked research ship known as the *Borealis*. But when *Borealis* fell by the wayside midway through *HL2*'s development, the Odell model went into freefall until the role of Colonel Cubbage came into being.





Dog

Dog was one of the few creatures that went from the first sketch straight into the game with relatively few changes to the design. Valve artists were inspired by classic movie robots, as Dog is a near cousin to Robbie from *Forbidden Planet*.





Two rebel line-ups: medics and fighters



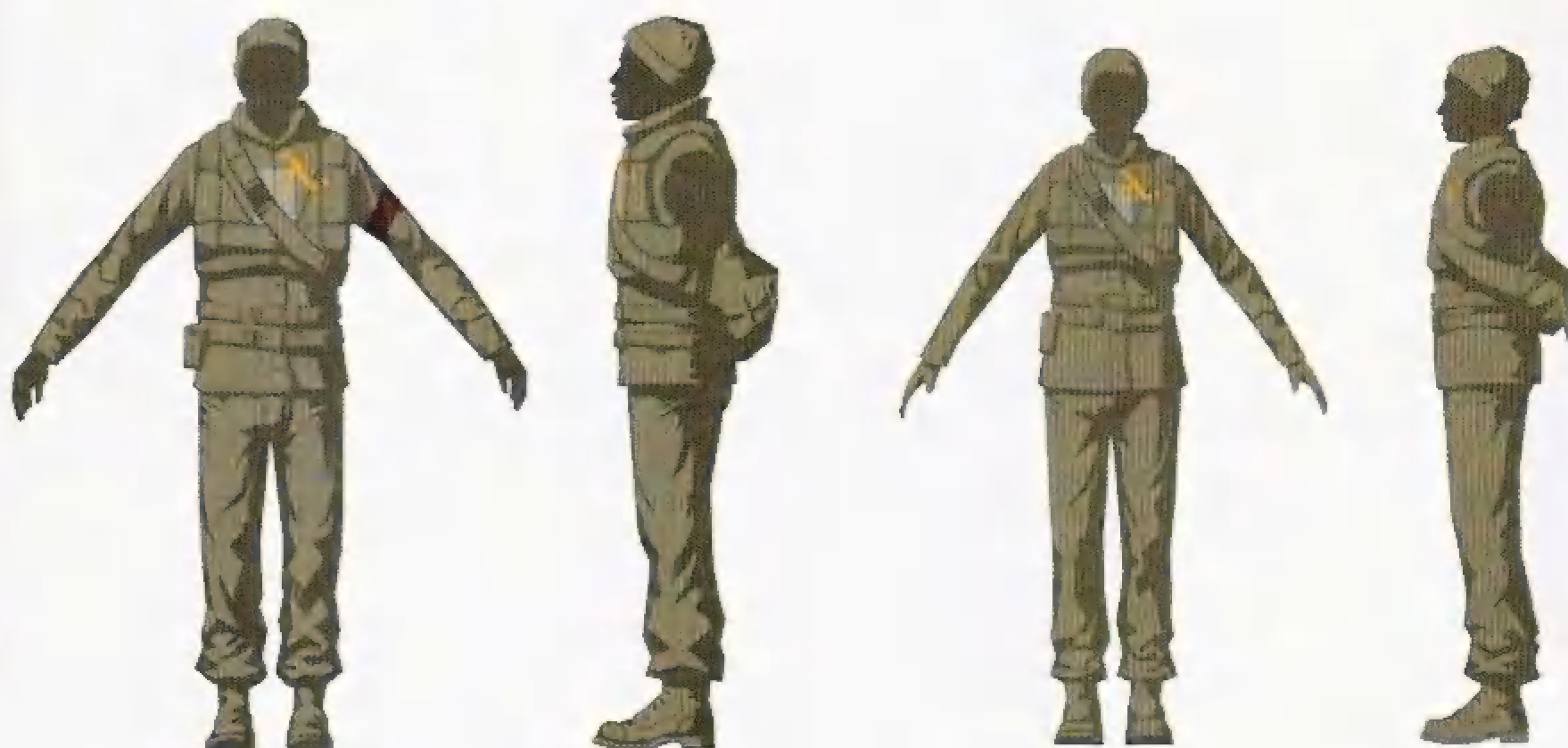
Resistance Fighters

Moby Francke & Ted Backman

"It took multiple iterations by many different artists to come up with a final design for the citizens. One of the biggest challenges was trying to make each citizen group and each individual within each group have a unique look. This meant that people in City 17 or the Coast would have a different appearance and feel from those fighting in the rebellion. Also, at times you can see and interact with several citizens at once, so we had to make sure that they were unique enough for the player to not approach them as clones of each other, but to actually care for them as individuals." - Ariel Diaz



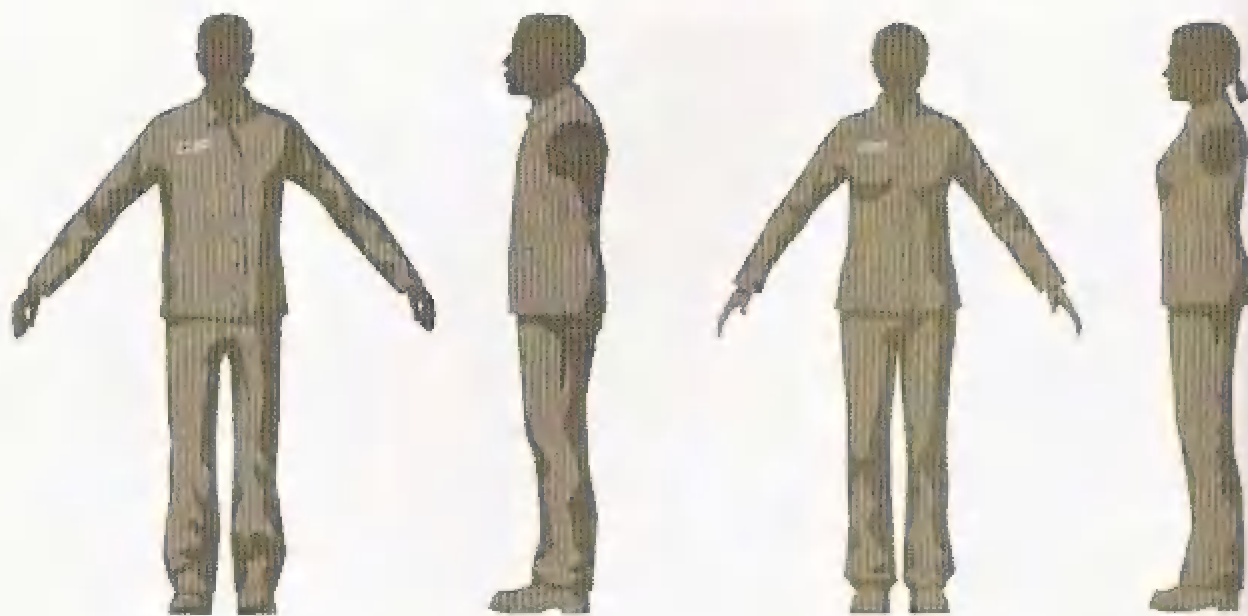
game texture sheet applied to male medic model



Repatriated Citizens

Moby Francke

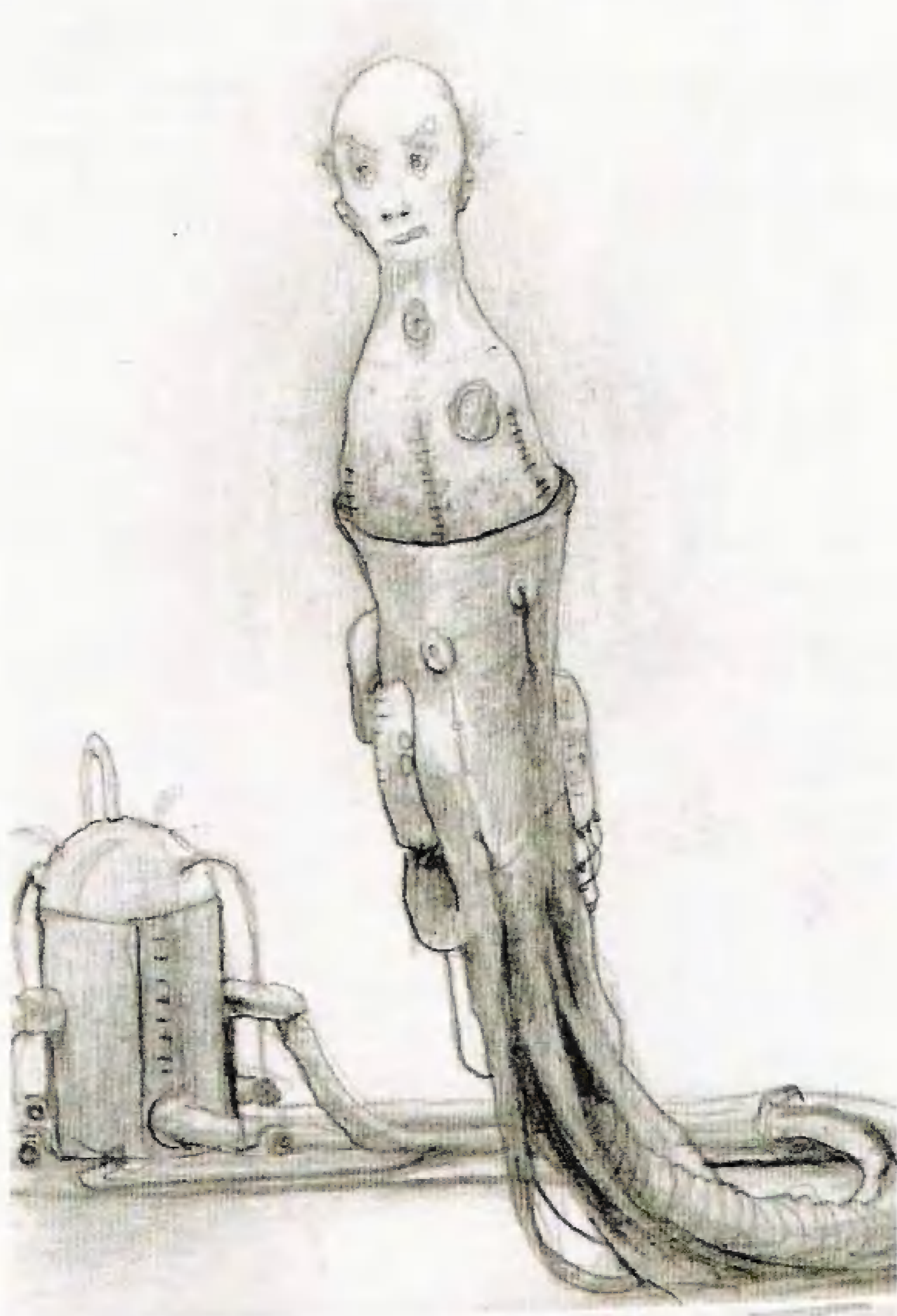
"We designed the citizens of *Half-Life 2* to look oppressed and downtrodden. Their costumes reflected the location and environment they lived in using standard-issued clothing to give it a prisonlike atmosphere. *Half-Life 2* spans three days, and we wanted the citizens to correspond with the time and location of events throughout the game. Citizens appear in almost every map of the game, but couldn't overpower the player visually. We wanted them to complement the world and not stand out." - Moby Francke



City 17 Gas Mask
Citizen
Dhabih Eng

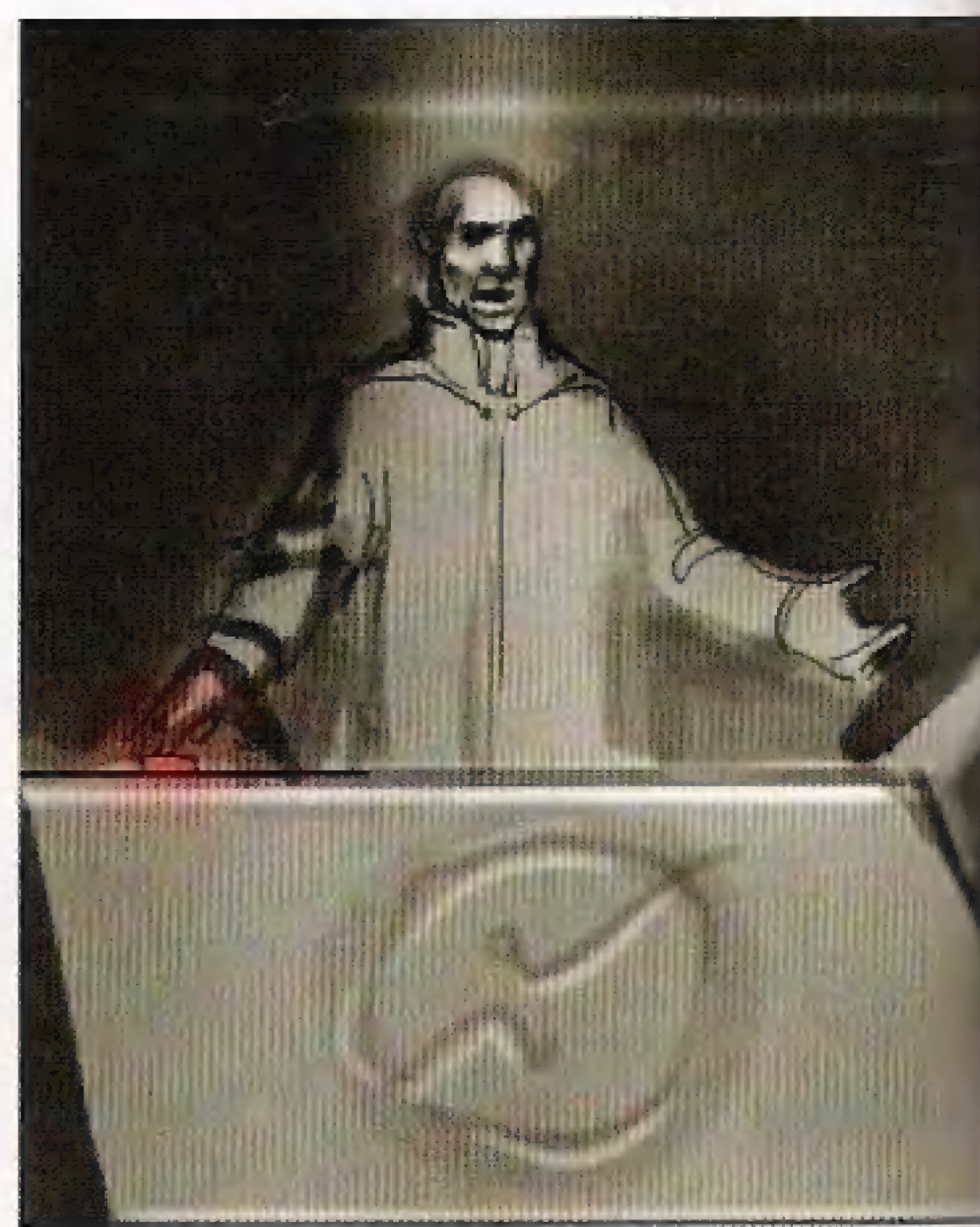






Doctor Wallace Breen
Ted Backman & Dhabih Eng

This concept sketch shows an early version of Doctor Breen's reveal (above left). The player was to have seen his face on monitors during the course of the game, but upon finally meeting Breen, he had begun the process of becoming immortal through Combine artificial life-support technology. Breen was originally referred to as "The Consul" (left, right) and finally the "Administrator."



From: Greg Coomer
 Sent: Friday, August 22, 2003 7:19 PM
 To: Bill Van Buren; Marc Laidlaw; Dhabih Eng; Bill Fletcher; Viktor; Randy Lundeen
 Subject: RE: Please help Dr. Breen

So many good ones to choose from. I'm really struggling to pick a favorite, mostly because I don't know enough about Dr. Breen.

Here's what each pair of frames communicates to me:

- b This one's growing on me the more I look at it. Makes Breen a bit more.. virile and slightly more evil. They also make him look unstable, and vaguely homosexual.
- c Makes him seem a little evil, and like he's got a high opinion of himself. (might be a good thing?)
- d Is style-less, and makes him less interesting.
- e Very engineer-ish. Doesn't seem to go with his sophisticated clothing & grooming.
- f Absolutely does go with his clothing, and also makes him look a bit old, upright, & less virile. (might be a good thing?)
- g These are pretty lightweight (visually), but manage to make Breen look rather old and quiet.
- h "I am an avant-garde conceptual architect, and I would prefer to not talk with you right now, or ever."
- i A good cross between sophisticated and simple function. These frames don't dominate Breen's face, which is nice. They make him more approachable than most of the others, but also make him look a little weak. They're more of a blank slate, and leave room for him to be an interesting, complex character.

-----Original Message-----

From: Marc Laidlaw
 Sent: Friday, August 22, 2003 11:59 AM
 To: Bill Van Buren; Dhabih Eng; Bill Fletcher; Viktor; Randy Lundeen; Greg Coomer
 Subject: RE: Please help Dr. Breen

I vote b or d...although I'd prefer an even more strict pair of reading glasses (narrower, no bar across the top).

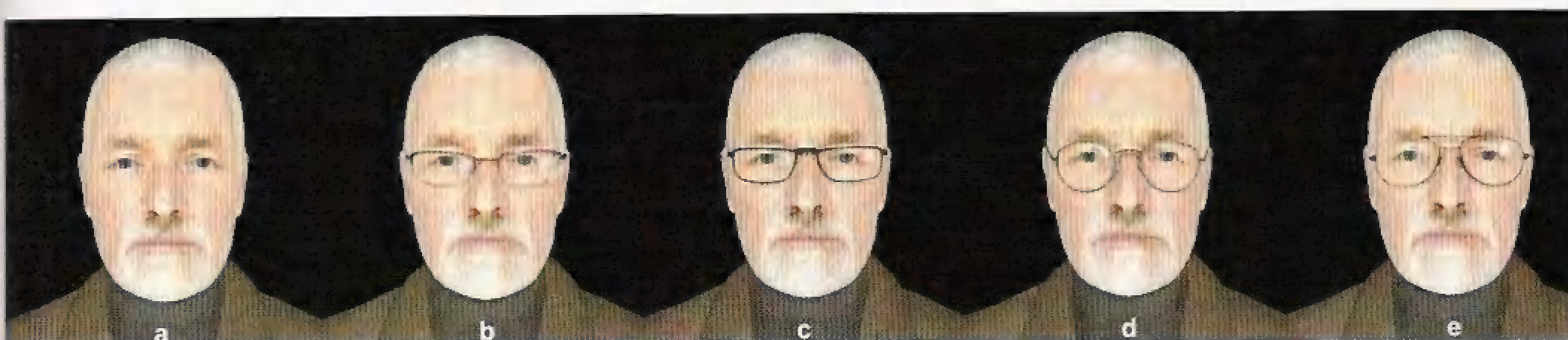
-----Original Message-----

From: Bill Van Buren
 Sent: Friday, August 22, 2003 11:56 AM
 To: Marc Laidlaw; Dhabih Eng; Bill Fletcher; Viktor; Randy Lundeen; Greg Coomer
 Cc: Bill Van Buren
 Subject: Please help Dr. Breen

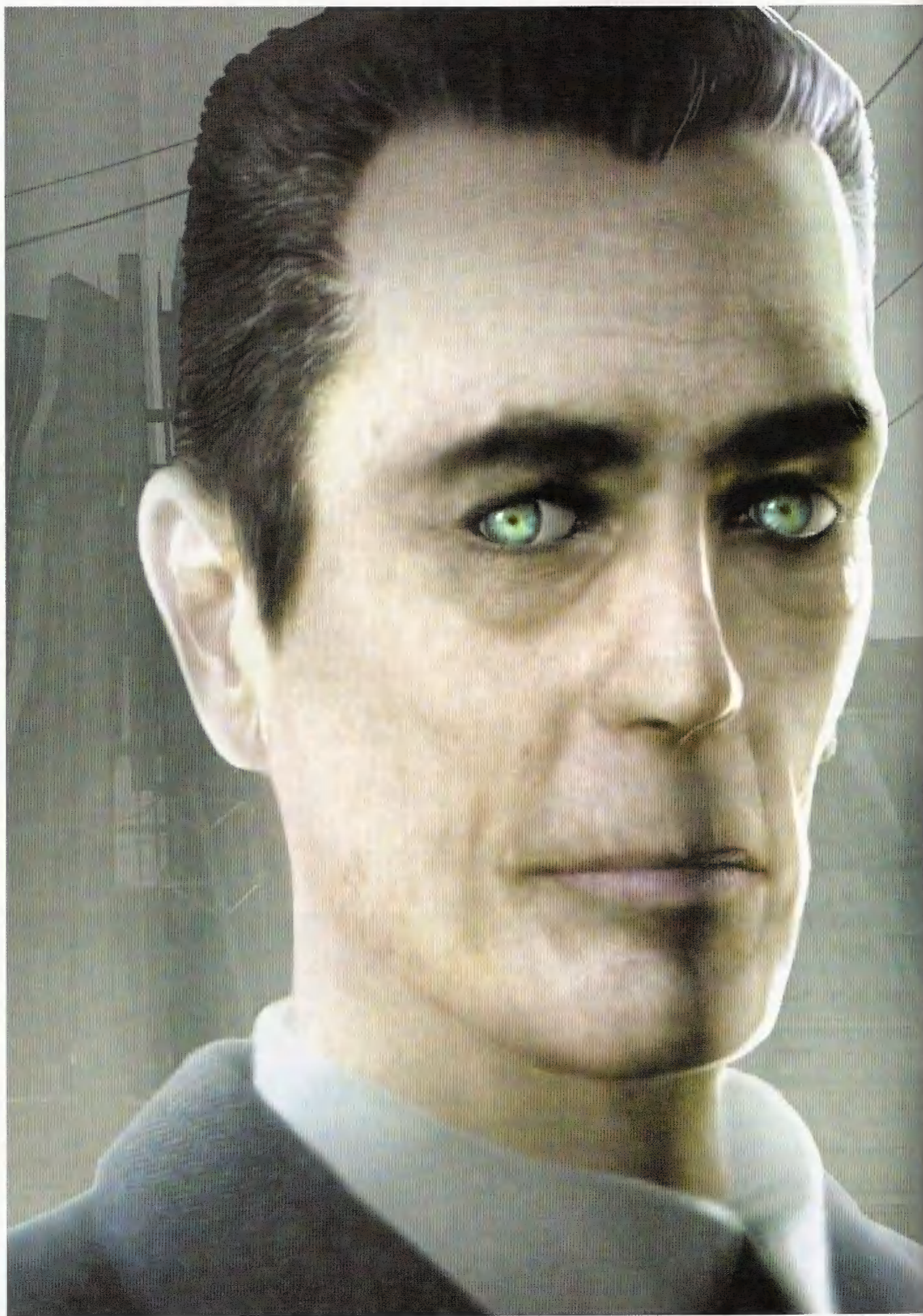
Dr. Breen has been noticing that he's having increasing trouble reading his frequent announcements to the citizens of City 17. He has come to the conclusion that the right pair of glasses might enhance his appearance as the "administrator" of City 17 while easing his eye strain.

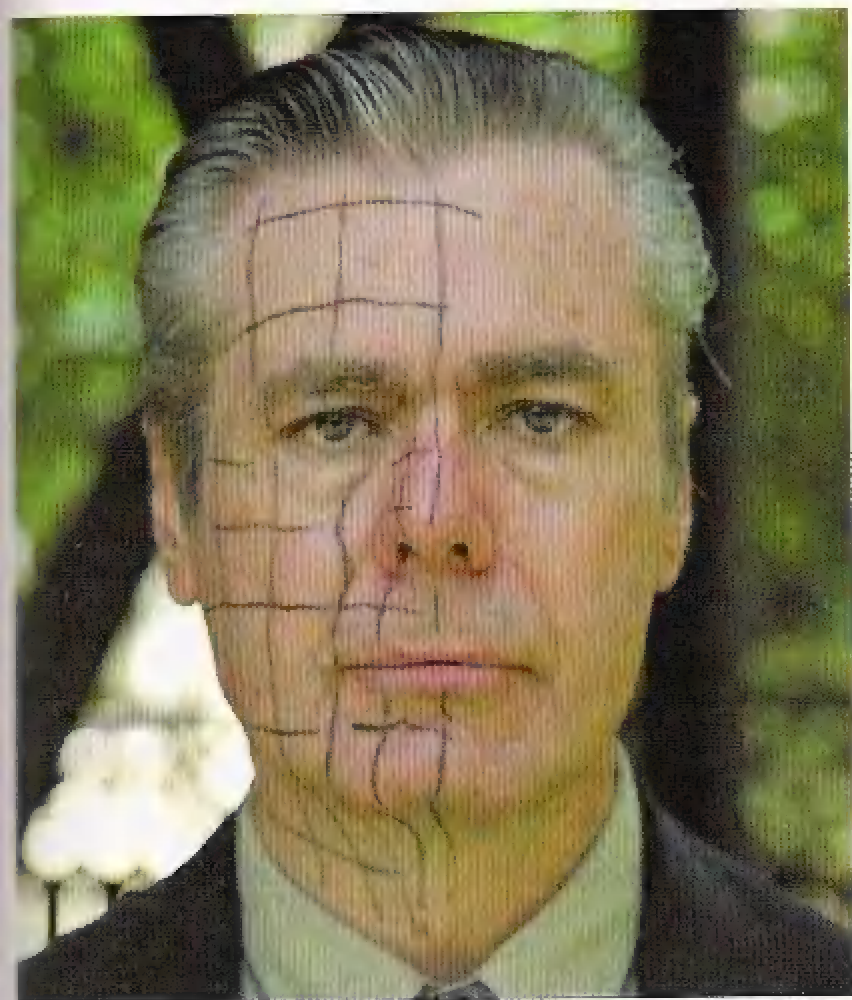
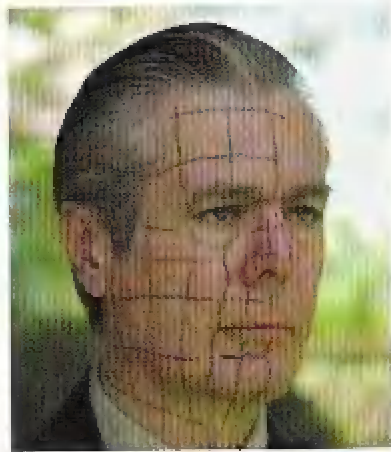
Will you help Dr. Breen choose the right corrective eye appliances?

- a) contacts
- b) stylish black
- c) for that 'bookish' look
- d) a bit more daring
- e) standard aviators



A look behind the scenes during *Half-Life 2* production: This e-mail from Bill Van Buren asks other developers for thoughts on the type of eyewear appropriate for Doctor Breen.





G-Man Dhabih Eng

World-renowned Alexander Technique practitioner Frank Sheldon was originally considered as reference for Doctor Breen. Bill Van Buren sent around a hastily Photoshopped image of Sheldon, with chopped-off hair and a scaled-down face shape. It became apparent to everyone on the team that this was actually the G-man instead. The grid drawn on his face is used in building the 3D mesh to construct an accurate and quick recreation of facial topology. Van Buren built the basic model, then passed it on to Dhabih Eng who pulled in the cheeks and darkened the eye sockets to give him the gaunt G-Man look. Animator Doug Wood, in the process of animating all of the G-Man's facial expressions, spent weeks in front of a mirror practicing the expressions on himself first.

"Animating the G-Man was a sheer joy. Michael Shapiro did a wonderful job giving him a more sinister edge than he had in *Half-Life 1*. I wanted the player to never quite know what side the G-Man was on. I would have him express an apologetic look toward Freeman as he 'regretted' to put Mr. Freeman in this situation, but then give a slight smirk or smile at the end to keep you guessing about his sincerity."

- Doug Wood



TIMELAPSE OPENING [Proposed 6/2/00]

The basic idea is to convey the passage of time between HL and HL2 visually, using our new terrain and shader effects and the teleport tricks we used in the original Test Chamber Disaster sequence. It should be a direct continuation of the end of HL: You are still in the G-Man's custody and control, still basically suspended outside normal spacetime, which makes it fairly easy to say that 10 years have passed in what for you is the blink of an eye...

FADE IN

EXT. WIDE GREEN MEADOWS

You fade in standing on a slight rise in the midst of beautiful rolling hills. The grass is green; at your feet is a small flowing brook; the hills are crowned with occasional willows. The sky is blue and fresh; birds are singing in the trees. In the distance, on the horizon, is a modern city. It's an idyllic scene. You can almost smell the fresh air. We show our terrain in all its splendor.

The G-MAN appears just behind you—or perhaps he has been standing there all along. You are still contained in his sphere of influence, meaning that you can turn and move in any direction, but only for a very short distance. You cannot leave the crown of the hill.

G-MAN

Hello again, Mr. Freeman. Sorry to keep you waiting. Not that the passage of time has had any meaning for you, but elsewhere it's a different story. I've been wondering how to explain what the world has become in your absence. I decided to simply show you.

There is an odd quickening, a sense of metamorphosis in the environment. The sky begins to darken ominously. The vivid green color begins to leach from the grass and leaves. The bird song is fading. The sound of wind begins to sweep up. The running water in the creek sinks into its bed.

G-MAN

Don't blink or you will miss it. Sometimes everything can change...overnight.

There is a flash. Suddenly everything has changed. The earth is brown; the sky is grey. The streambed is dry and black. The trees are twisted skeletons now. The sound of birds has been replaced with the distant cries of houndeyes and bullsquids. A crow crouches in the black willows, cawing. On the horizon, the city appears grey, no longer lively. A pall hangs over it. In the sky, streaks of deadly light, dark aircraft. Explosions bloom on the horizon. Louder, louder, the explosions coming closer, closer. A Combine dropship screams overhead and there is another explosion, surrounding you.

Throughout all the changes, the G-Man continues to talk calmly.

G-MAN

Don't be nervous, Mr. Freeman. We're not really here...not yet anyway.

Another flash engulfs you, and as it fades you find the land has changed again. The earth is utterly blasted. The streambed is choked with ashes. The trees are gone. There is a new sound in the wasteland where you stand, an ugly insect chirring. The city is a blackened ruin, its surviving towers tilted and about to fall. The sky is choked with smoke. From the center of the city, an alien spire begins to rise, towering over the damaged human structures. A light flares out from the spire, like a beacon.

G-MAN

Ten years is a long time for most people—a lifetime for some. Long enough to heal the first scars of the whip. Long enough to forget the little things, like the taste of fresh air. But you remember, don't you, Mr. Freeman? It was no time at all, for you.

As he talks, a strip of shining rail begins to extend across the land in front of you, pointing toward the city. In the distance, you begin to hear the sounds of a train. It gets louder and louder as he speaks.

G-MAN

I think that covers just about everything. All that remains is to put you in the picture.

The Wasteland Train appears, slicing into view like a rusted knife. It squeals to a halt directly in front of you, and sits there hissing and ticking as it cools. A door opens in the side of the rear car.

G-MAN

All aboard, Mr. Freeman. Time waits for one man.

You climb aboard the train. There are several passengers on the car, but they are frozen in their seats, caught in mid-motion, completely unaware of you.

The door hisses shut. A moment later the sounds of movement commence. The train begins to crawl forward. The G-Man slides out of sight on the blasted hill. And the other passengers slowly, then abruptly, lurch back into life.

One of them, Samuel, looks up at you sharply.

SAMUEL

Hey, you startled me!



Captain Vance

Dhabih Eng

In early versions of the game, Alyx was the daughter of a military man, Captain Vance, though she was very close to Eli. Vance played a compromised and dangerous role protecting the Air Exchange, while secretly organizing resistance fighters. When the Air Exchange was cut in the process of development, Captain Vance was a casualty. In one stroke, Alyx became Eli's daughter, thus tightening up the core cast of characters. Vance's face survives as the basis for one of the nine male citizen heads and also currently exists in his purest form as one of the hostages for *Counter-Strike: Source*.

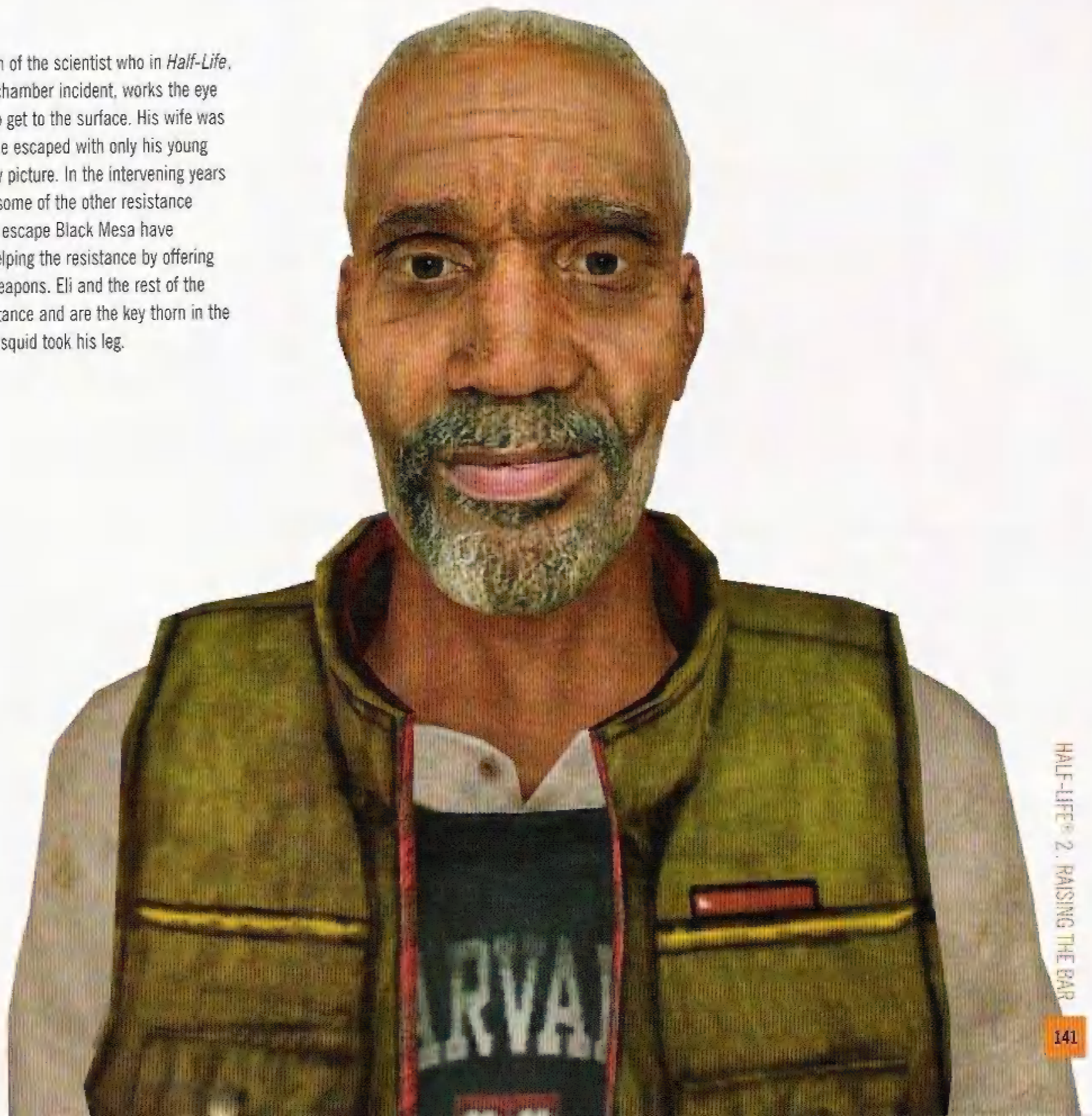


An early concept sketch of Eli Vance with prototype physics manipulator



Doctor Eli Vance
Dhabih Eng

Eli is the *Half-Life 2* version of the scientist who in *Half-Life*, immediately after the test chamber incident, works the eye scanner and tells Gordon to get to the surface. His wife was killed during the disaster; he escaped with only his young daughter, Alyx, and a family picture. In the intervening years since the incident, he and some of the other resistance scientists who managed to escape Black Mesa have dedicated themselves to helping the resistance by offering support, technology, and weapons. Eli and the rest of the science team run the resistance and are the key thorn in the side of the Combine. A Bullsquid took his leg.



* Eli powers up the slide projector. A white image flashes on the wall of his room, where he has hung a white sheet.

ELI
Let's see now...where does this start?

The following images appear as he speaks:

- * Aerial view of Black Mesa
- * Inbound train
- * Test Chamber

ELI
Black Mesa. Let's not dwell on that. Nobody's blaming you. We all have to accept some responsibility...what matters is what we do next. I'll get to that. After the disaster, well...let's just say, the ripples kept spreading.

The next few scenes have the feel of Norman Rockwell in Hell:

- * Headcrabs leaping onto shoppers from supermarket shelves
- * Bullsquid chasing a family from a suburban house; pack of houndeyes roaming down Elm Street
- * Gargantua overturning a tractor as a farmer flees across a Nebraska field
- * Ichthyosaur materializing in a public pool, right under a nose-pinching kid who just jumped off the high-dive

ELI

The countryside, the suburbs, all those hard-to-patrol places, got pretty much uninhabitable. People started crowding into the cities for protection.

* People clustered at a cyclone fence topped with razor wire, city skyline rising behind them; cops stand tensely on guard towers, blasting away at headcrab zombies outside the perimeter.

ELI

There was an illusion of safety, for a time. And then the Citadels appeared. It happened in a split second, all over the world. A chunk would disappear from the center of a city, to be replaced an instant later by one of these...headquarters for the Combine. Invasion Central.

- * City-center completely cored, buildings sheared off, an enormous pit appearing out of nowhere, and people falling into it
- * The same view, with a Citadel now towering at the center of all

The Slideshow Briefing

Marc Laidlaw

In early versions of the *Half-Life 2* script, Eli Vance subjected Gordon to a slideshow that served to flesh out the lost time between *HL1* and *HL2*.

"I was really hoping that by describing these scenes, I could trick Dhabih Eng into painting them." - Marc Laidlaw

ELI

Say hello to your new masters.

- * Cremators, striders, Combine machines pouring out of the Citadel into the city. Combine dropships tearing through the air.

ELI

Oh, we resisted.

- * Tanks, soldiers, human army advancing on the Citadel
- * The same troops reduced to ashes, completely obliterated

ELI

Earth put up a fight that lasted all of seven hours.

- * A smoldering Pentagon-shaped pile of ashes

ELI

And then, one man who had seized about all the power a man can seize in a crisis, used that power to arrange our surrender.

- * The Consul, at the foot of the Radio Tower, wearing a headset, hands raised high to the dropships as he proclaims Earth's surrender

ELI

They call him the Consul now. It worked out fine for him. He speaks for the Combine; he shares in their power. As for the rest of us....

- * Views of City 17, citizens slouching along
- * Air Exchange belching black fumes
- * Drained seabed with beached ships, whale bones

ELI

Well, you've seen the state of things. They're replacing the air with something we can hardly breathe. They're draining the ocean. We don't know if they're preparing the planet for new residents, or just stripping it of every possible resource. All we do know is that we have to stop them. And that's where you come in, Mr. Freeman. It's up to you to....

- * The projector goes dark.

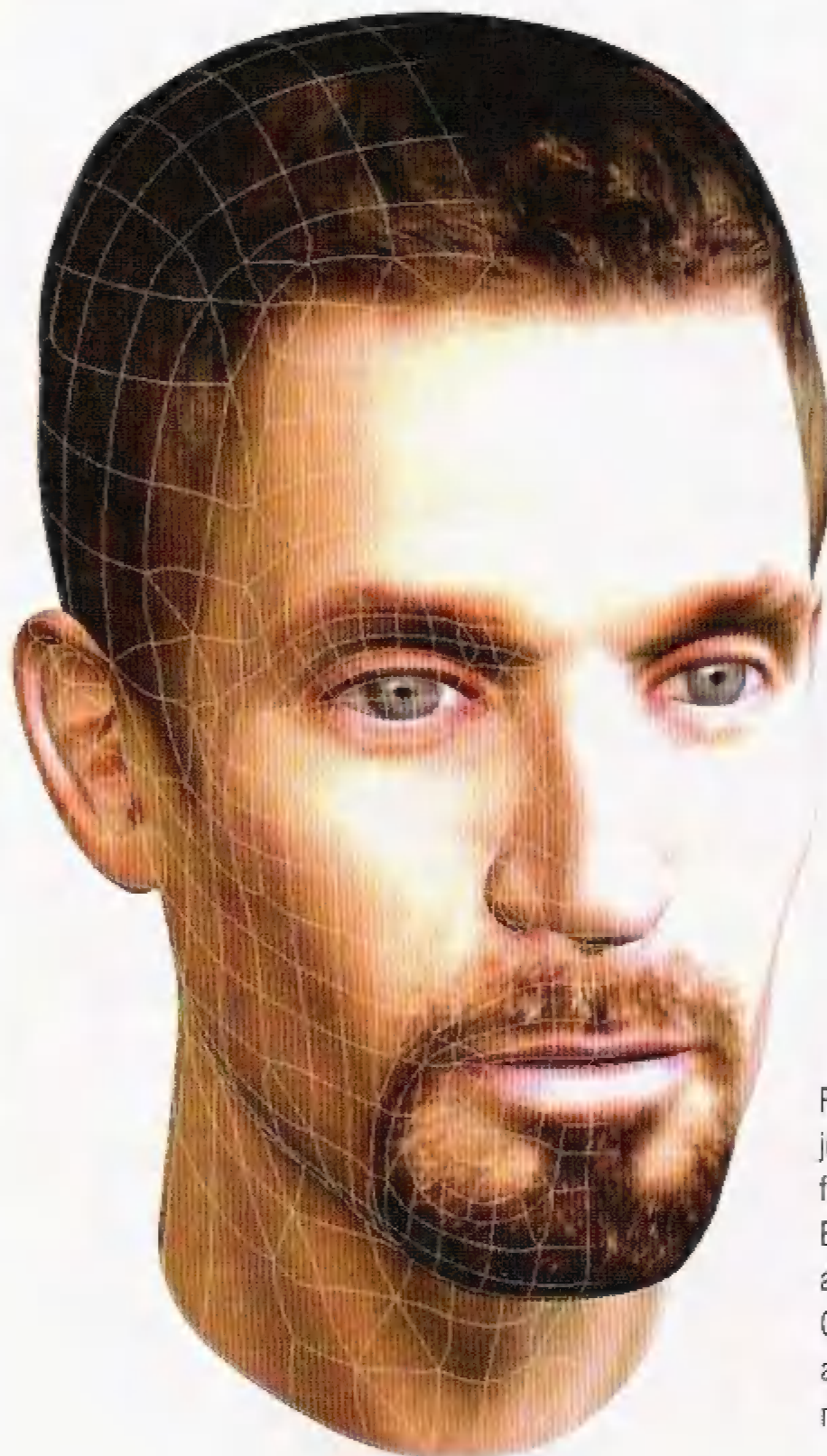
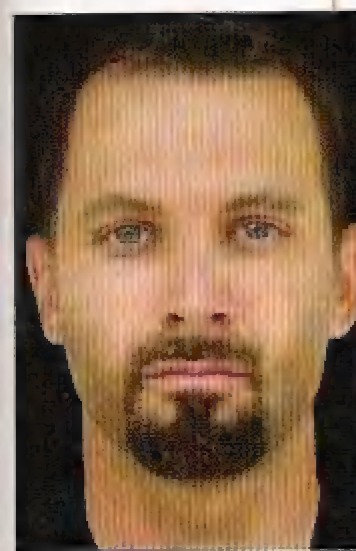
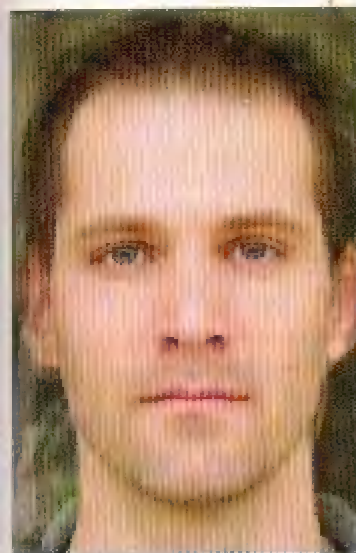
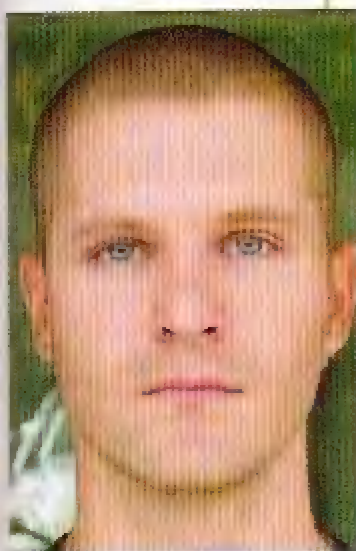




Gordon Freeman
Dhabih Eng

An early illustration from the first year of development where Alyx was to have a pet alien named Skitch. Dog is shown in the background as a rough idea, before any real design was completed.



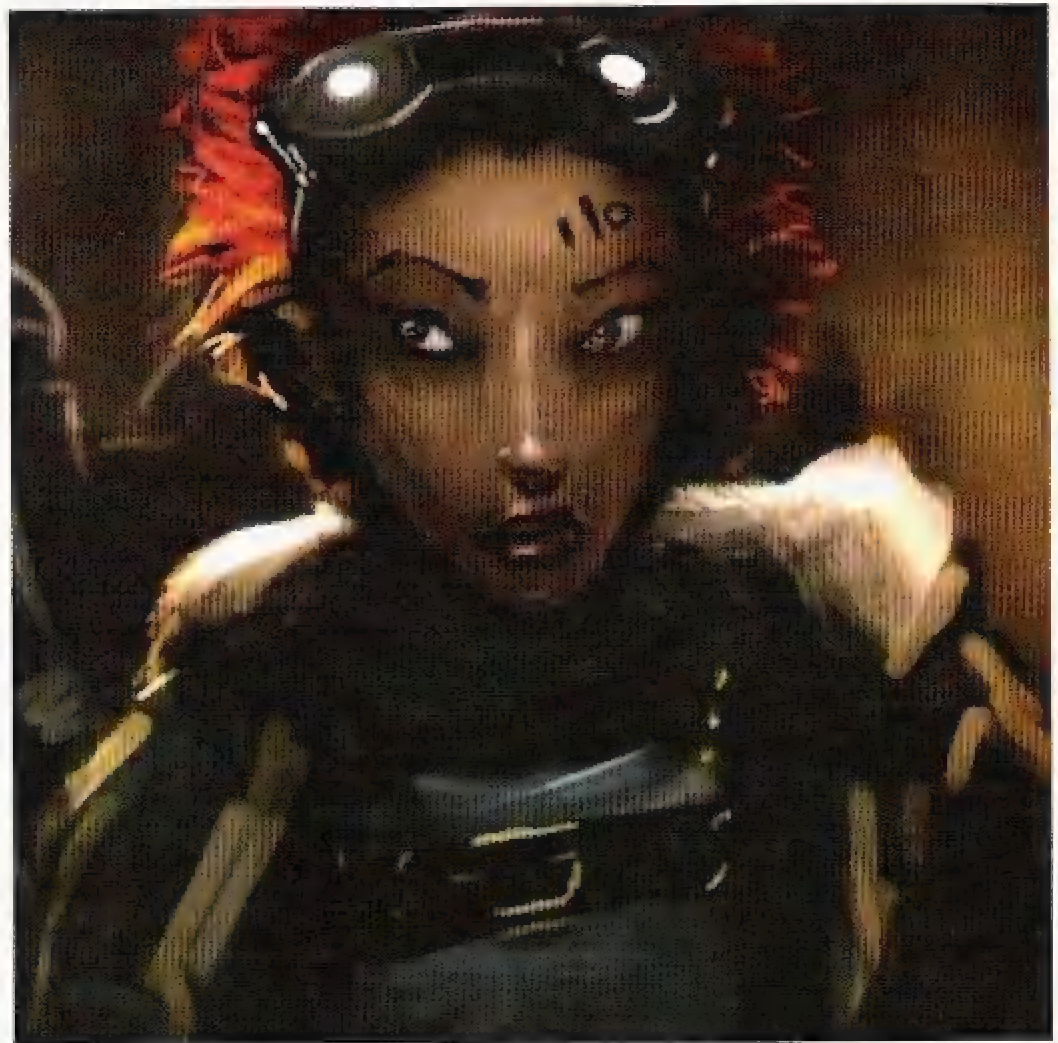


Providing the face for Gordon was too big of a job for just one person. Valve designers took front and side photo reference of David Speyrer, Eric Kirchmer, Greg Coomer, and Kelly Bailey and morphed them to create the texture for Gordon's head. Reference of Greg was used as a starting point for building Gordon's head model in XSI.









Alyx Vance
Dhabih Eng

Early concept sketches of Alyx Vance, and photos of Jamil Mullen, who served as the face and body model for Alyx. Mullen spent several days in a motion capture studio recording running, jumping, and combat animations, which were used as the starting point for her animation library.

"The original design for Alyx lasted through much of the development cycle, however, when it came time to unveil her to the world at E3 we had to rethink our approach. Gabe posed the question, 'What makes her different than any other heroine in the other games?' At that point, not much. She had a two-toned bodysuit with knee-high boots, belts, buckles, and not much in terms of freshness. So just a week or two before our announcement, we had to scramble to come up with a better design immediately. Emergency weekend meetings were held with a small group and we brainstormed ways to make her stand out from the rest. Ideas ranged from giving her glasses like Gordon to making her more of a tinkering mechanic, and at one point, giving her braces, which thankfully didn't stick. I made some quick sketches in those meetings as the ideas floated around and eventually we had our Alyx: a young, feisty daughter of researchers, who wasn't afraid to get dirty and make the most of what she had, such as duct taping the holes in her jacket, wearing her old Black Mesa hoody, and keeping her tool belt by her side."

- Dhabih Eng

A short story written and handed out to the HL2 development team for design inspiration

ALYX

How long he had slept—how he had even managed to sleep—Gordon was unsure. The sound of the tracks clattering somewhere underneath the boxcar must have lulled him. And he had been moving nonstop for so long now; no wonder exhaustion had finally claimed him. But suddenly the pitch of things changed. There must have been some hint of it, reaching into his dreamless sleep like a premonition, for he woke a moment before there was any overt reason to awake. He was still alone in the munitions car, hidden among the crates and canisters, all of it gently shuddering from side to side, the smell of machine oil and the stink of diesel filling the air. He was hungry, with his meal at Eli's now many hours behind him, and it was cold, as if the suit's regulators were not functioning properly. He was beginning to develop a dread that the HEV suit might crap out at any moment, leaving him stranded, with its mnemoflex joints frozen into a rigid state, its autolocks dead. Here he would lie, awaiting the arrival of the guards like the rest of the cold unmoving crates in the car.

But the dread had little time to develop, as the explosion cut it short.

The train rolled sideways, flung from the track. The crates that had shielded him now flew away from him, and he curled into a ball to let the suit protect as much of him as possible from the heavy containers. Even several of the cases strapped to the walls or bolted to the floors tore loose in the moment, the immense torque shearing steel bolts clean off. Gordon came to rest as an alarm whistle shrilled; he had managed to land on top of a cabinet the size of a refrigerator. He could hear shouts, gunfire, more explosions in the distance. He stood up on the cabinet, reaching for the side loading door which was now directly overhead; he could barely reach it, and knew there was little chance that it would budge, even with better purchase.

Suddenly footsteps clamored across the door. Paused. He imagined soldiers up above, swarming to protect their shipment. Something clanked down on the thick metal with a maddeningly familiar sound. Where had he heard it before?

The faint high-pitched whine of an activated detonator brought the memory into clear focus.

Gordon leapt for the farthest corner of the car, sheltered by the cases that had nearly killed him, hoping that now they would save his life.

The blast came the instant he hit metal. Shrapnel seared the back of his head; there was an acrid tang that sent him up coughing. It was partially from the open air, partially from the explosive. He rose up involuntarily, wracked with fumes, and saw the night sky above him. The current ceiling (once wall) of the boxcar gaped inward like a scorched metal flower. There were a pair of legs dangling in past the sharpened petals. Legs sheathed in black, heavy boots swinging back and forth as if the wearer had just dropped down at the edge of a pond to fish. But instead of a fishing pole, there was a gun trained down on him, its laser site picking him out in the smoldering dark. He shaded his eyes from the red beam, and heard a soft voice whisper something like, "Check him, Snitch."

Gordon gasped as a thing hopped down into the car and came toward him, hopping from crate to crate as it sniffed him out. It looked wet, permanently; the colors were of a toxic brilliance; he couldn't find the eyes, but it had far too many teeth. It crouched above him, flicked its tongue out for a taste, and he felt an acid welt begin to rise across his cheek.

"Don't move," said the person above him. "One bite and you'll be dead by your next breath."

Then he heard a thud, and the figure dropped in. He knew instantly—even with the heavy black gear, the belts of ammo, the goggles and the short-cropped hair—that it was a woman. She crept up until she was next to her pet. She made a click with her tongue, as if gentling a horse, and the thing wound around and flowed onto her shoulder, settling itself there like a glistening stole.

A light clicked on, blinding him. And she gasped.

"You!" she said. "What're you---"

At that moment they both heard footsteps outside--grinding through cinders, it sounded like. She switched off the light and he felt a gloved hand over his mouth. As if he needed silencing. The steps were coming closer, but

there were no voices; they must have had a way of communicating silently. He had no doubt the car was being surrounded.

"All right," she whispered, "I'm going to trust you. I can use some help carrying stuff anyway. Take this, and come on up."

She unhooked something from her belt; Gordon felt a weapon pushed into his hand. He wasn't sure what it was, but he found a trigger, and that was enough to get started. She gave him her hand and he scrambled up onto the box as quietly as he could. She hooked her fingers over the edge of the blasted opening, hauled herself up, knelt there in silhouette on the top of the car. As Gordon started up, she began yanking grenades from her belt and lobbing them down into the shadows around wherever the car had come to rest. The explosions were mixed with the sound of metal tearing, and ragged screams. Gordon rose up beside her, firing down at the figures moving below. The faint light that pervaded the open tracts of wasteland gleamed on metal, but he couldn't be sure they weren't men as well. It was over in a few moments; she had an uncanny accuracy with the grenades that didn't seem to be entirely related to their advantage of height.

"More on the way," she said. "Big ones. Let's stock up and get out of here."

She ducked back into the boxcar. He heard a muffled explosion as she blasted open a container down below, then she started tossing smaller cases up to him. A moment later she was up again.

"Oh, I'm Alyx," she said, stuffing the cases into random pockets on her outfit. "I already know who you are. And I think I can probably guess where you're going."

She pointed out a mounded shape, just visible through the enveloping smog; it looked like the shell of a vast slumbering beetle; a streamlined mountain of corroded metal. From the density of the fumes, the stink in the air and the burning in his eyes, he suspected he had arrived at what Eli had called, "The Air Conditioner."

Alyx tensed and got to her feet, swinging her gun down into her hand. Something was coming. Out on the horizon, jaunting through the fog with a long-legged gait, more than one of them. He squinted, making out what looked like an enormous tripod, surmounted with a huge body, a faint sheen of lenses. He thought of Dog, briefly; one of Dog's cousins, at the height of its powers. There was a sullen flash deep in the eye of the distant thing, and suddenly he and Alyx were flung from the roof of the car. He came down hard in the cinders, lay there dazed for a moment, wondering where he was, until suddenly he felt tiny needles biting into his ear.

He came back to himself, pushing her little beast, Snitch, away from his head. The cub darted back, licking its jaws, baring the hypodermic teeth.

"She just gave you an adrenaline injection," Alyx said, holding out her arm as the thing climbed back up to her shoulder. "I didn't think you'd mind. Right now, we're going to need to run."

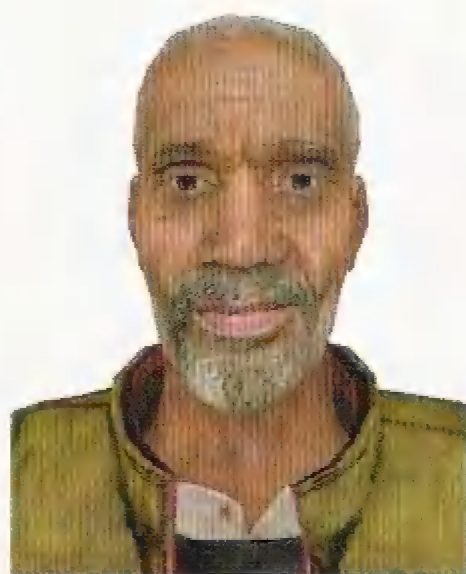
From the far side of the boxcar, the first of the tripods rose up and trained its eye upon them. The eye began to warm again, cycling up for another burst. Alyx had already scrambled away. Gordon was on his feet and running an instant before the thought of flight crossed his mind.

The landscape was coated in a poisonous residue, cinnabar and sulfur and whatever other precipitates came sifting down from the Combine's atmospheric reprocessor. Caustic particles drifted in a steady snow. Gordon clambered up a slope that crumbled into greenish powder under his gloves. Alyx was firing at something from the top of the ridge, then she leapt down into a culvert holding a thin stream of acid. Gordon splashed in after her, thinking he saw silhouetted figures on the far side—wondering if they had seen him. Alyx moved quietly up the gulley, but as Gordon followed he heard movement behind them. Tall shapes, gleaming armor, bristling with weapons, appeared on the edge of the ravine. So much for the advantage of height. Alyx noticed them at the same time he did.

"Shit," she whispered. "Combine Elite."

They looked like metal, but their movements were muffled, almost silent. Gordon never heard the squad that had dropped into the culvert ahead of them. All he knew was that suddenly they were surrounded...

THE VOICES OF HALF-LIFE 2



Robert Guillaume as Doctor Eli Vance

With dozens of screen and stage appearances to his name, Tony Award winner Robert Guillaume is best known for playing the title character in the sitcom *Benson*, and the voice of Rafiki in *The Lion King*.

"We gave our casting agents short character profiles for each role, including the names of a couple of actors as an example of what kind of voice/personality we were looking for. In Eli Vance's profile, we listed Robert Guillaume as an example of the kind of actor we were looking for. It never occurred to us that we might actually get Robert Guillaume himself to do the part—we were thrilled when he accepted."

- Bill Van Buren



Robert Culp as Doctor Wallace Breen

Best known for his work in the '60s TV series, *I Spy*, Robert Culp's biggest influence on *Half-Life*'s creators was his starring role in such classic *Outer Limits* episodes as "Demon with a Glass Hand."

"On the sample tapes for Robert Culp, he was reading some really awful, convoluted scripts and somehow making them entertaining. I thought, if he can make that stuff sound good, he should be able to do amazing things with Dr. Breen's announcements. At our first session with Mr. Culp, he excused himself from the studio for a short time to warm up his voice, and went off reciting passages from Shakespeare's *Henry IV*. At that point I got really excited about how Dr. Breen was going to turn out."

- Marc Laidlaw



Michelle Forbes as Doctor Judith Mossman

Michelle Forbes may be best known among gamers for playing Ensign Ro on *Star Trek: The Next Generation*, but it was her portrayal of *Homicide*'s forensic pathologist Julianna Cox that first made her seem ideal for the part of Dr. Mossman.

"When we saw Michelle Forbes' audition reel, it was a compilation of several scenes from her TV and film roles. Bill Fletcher, Bill Van Buren, and I watched them without speaking, and then at the end we were all sitting there choking back tears. This was from a few little vignettes on an audition reel."

- Marc Laidlaw



Michael Shapiro as Barney Calhoun and G-Man

Michael Shapiro, an actor and director of stage and film productions, has also done voice work on games as diverse as *Blood II* and *Spy Fox*.

"I've voiced a lot of interactive games. *Half-Life* is uncommonly well-written. Barney is a hoot, and I sympathize with him, but G-Man's got such great lines."

- Michael Shapiro



Merle Dandridge as Alyx Vance

Merle Dandridge's experience is mainly in live theater, including stints in Broadway and touring productions of *Jesus Christ Superstar*, *Aida*, and *Rent*.

"Our casting agents auditioned over one hundred actors for the part of Alyx. We listened to all of these and narrowed it down to five actors we felt were interesting enough to audition in person. At the end of the live audition, we didn't even discuss it. Merle Dandridge had the part, hands down. She's amazing. For Alyx, we needed someone with a beautiful voice, who could be charming, very feminine, and warmly intimate, but could then go into intense circumstances and be a strong, confident, and believable action character; we didn't hear many actors that could really deliver on both ends of this spectrum, but Merle did a great job with all of it."

- Bill Van Buren



Lou Gossett, Jr. as the Vortigaunts

Louis Gossett, Jr. won an Academy Award for his role in *An Officer and a Gentleman*, but it was his interpretation of the alien Jeriba Shigan in *Enemy Mine* that made him seem ideally suited to tackle the role of the hive-minded Vortigaunt in *Half-Life 2*.

"One fun casting challenge was the Vortigaunt. We were getting some really bad audition tapes for this part, and gave the casting agents some additional direction: Look, we want somebody speaking human language, but not human. It's like Vincent D'Onofrio doing Edgar in *Men in Black*. Or, another really good example is Lou Gossett, Jr. in *Enemy Mine*. That kind of approach is what we're looking for. Then we got the call that Lou Gossett, Jr. was interested in the part." - Bill Van Buren

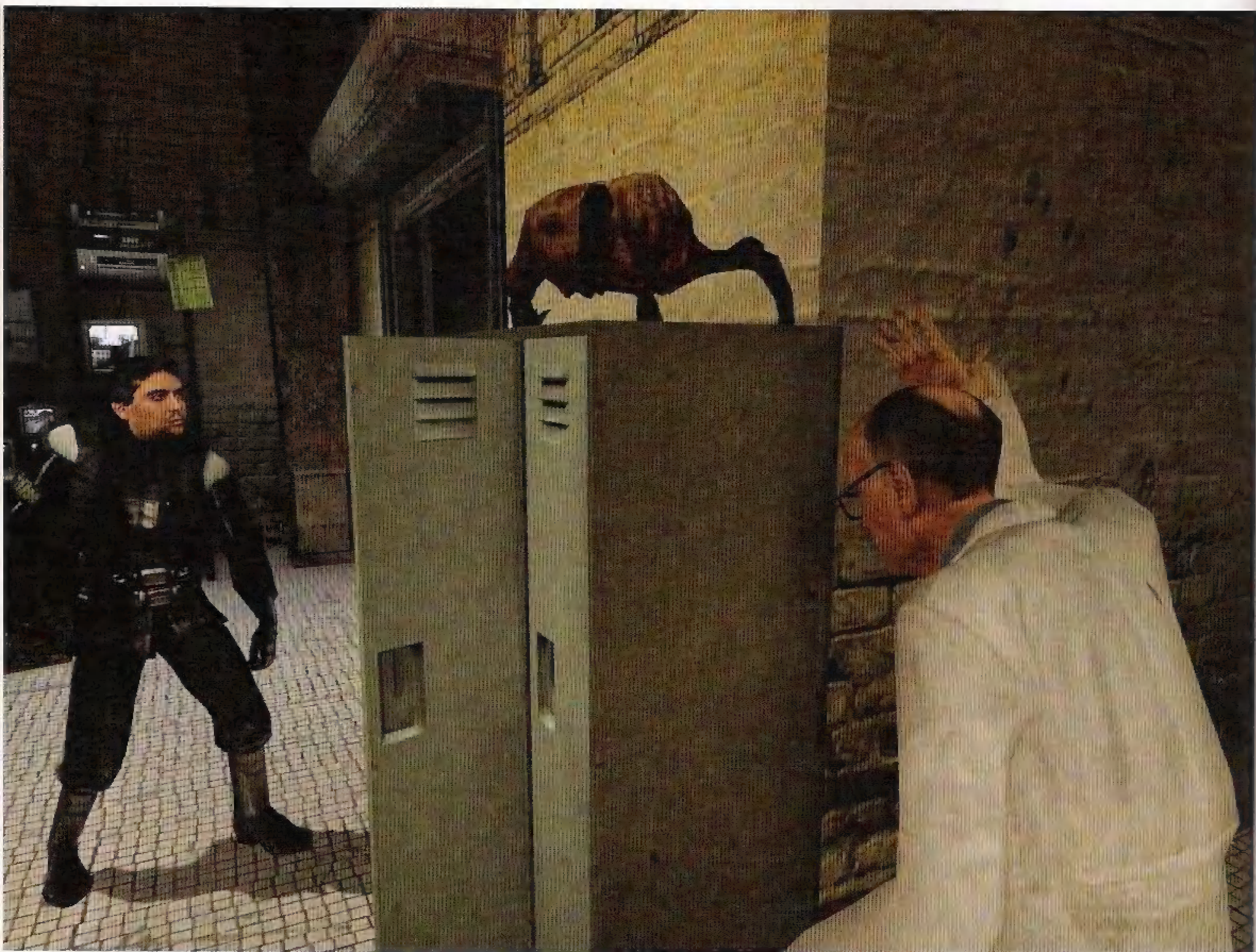


Harry S. Robins as Professor Isaac Kleiner

Harry S. "Hal" Robins has achieved cult celebrity not only for his highly detailed underground comics in such publications as *R. Crumb's Weirdo* and *The Meaning of Lost and Mismatched Socks*, but for his esoteric rants on Subgenius radio programs, aboard Spanish galleons at Burning Man, and in regular appearances as "Dr. Howl" in San Francisco nightclubs.

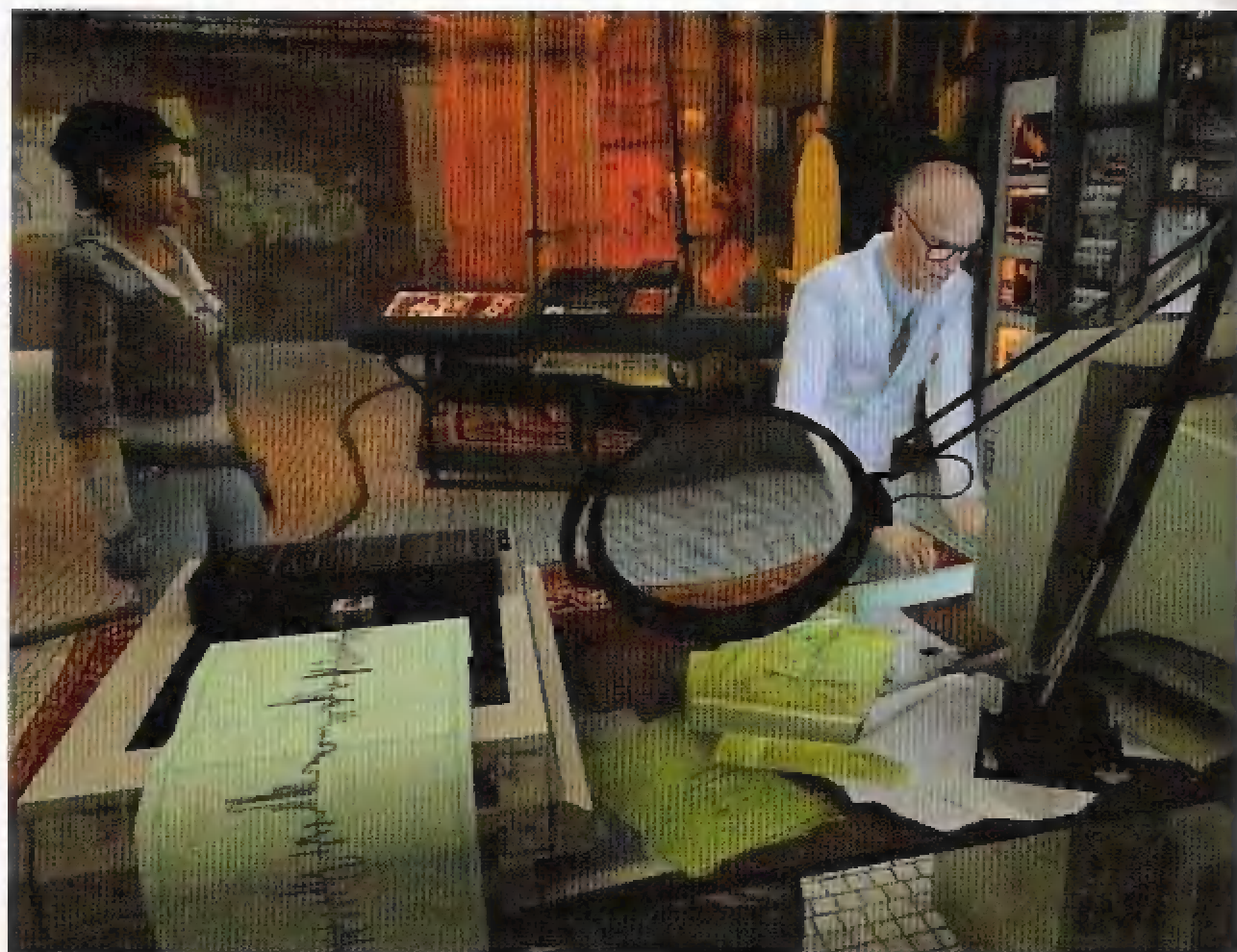
"When voicing the good scientist, I tend to follow my instincts. I visualize a peevish, condescending specialist, whose over-precise diction is intended for the benefit of those whom the speaker believes to be unintelligent and in need of explicit instruction. This in itself suggests a comic character portrayal. The best 'mad scientist' voice and manner which I know of, and which undoubtedly I tend to emulate somewhat, would be Lionel Jeffries in the British film *The First Men in the Moon*. A pastiche of his vocal mannerisms serves me well as my 'default' performance. I have always been assisted by useful supervision and direction, which eliminates the need for falling back on such tropes."

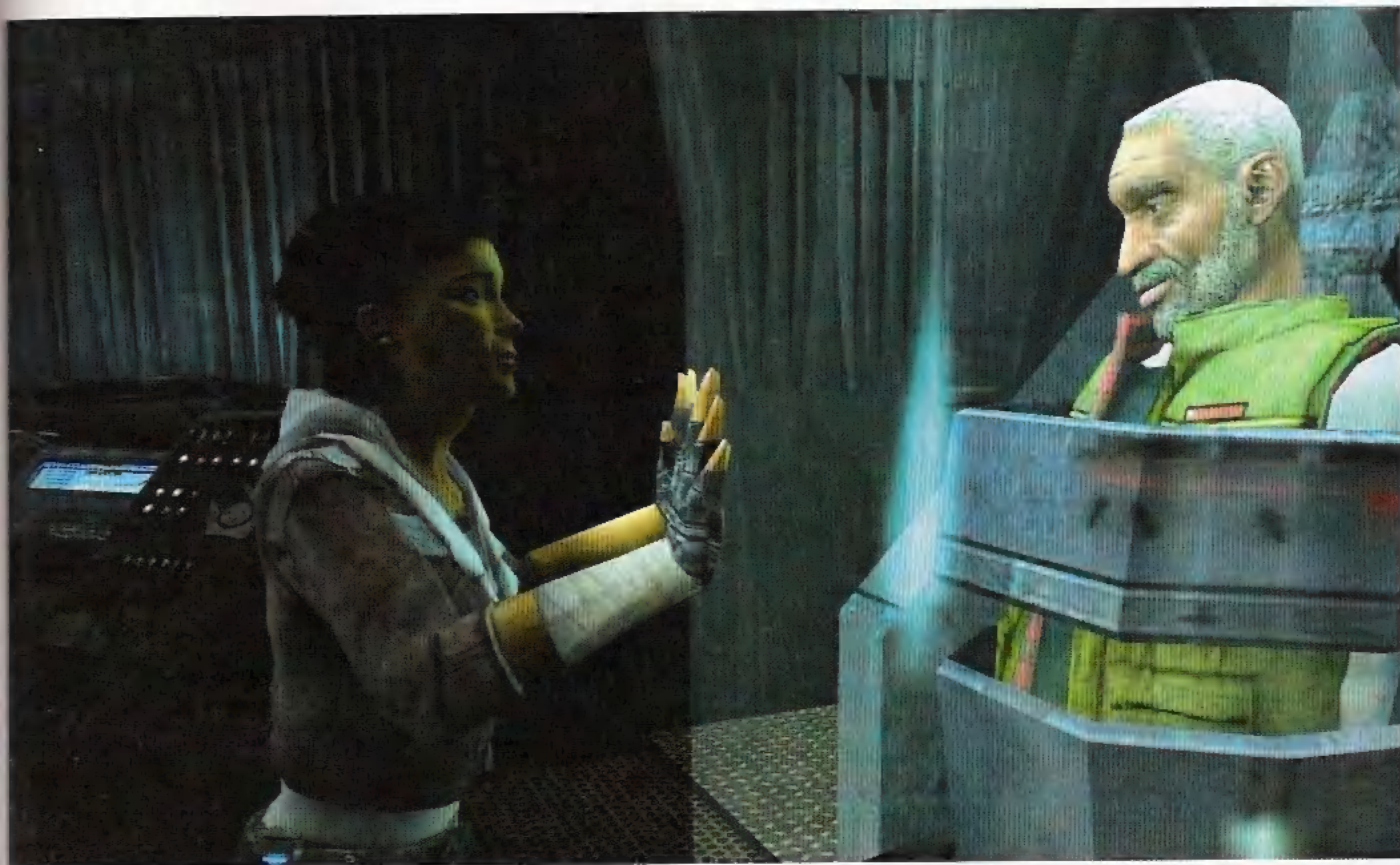
- Hal S. Robins



Valve's choreography team decided to tackle the Doctor Kleiner's Lab scene first, to have it serve as a template for the other dramatic sequences. They knew the characters had to be seamless and engaging in order to draw players into the world.

"Every scene started with a script, which went through many drafts and lots of feedback from the animators. I wanted to make sure that we were writing scenes that would give animators plenty of opportunities to do work they'd be excited about. Then when we came back with the recorded audio, we'd put together a radio play based on the script." - Marc Laidlaw





One of the most challenging aspects of the dramatic scenes was lighting the game characters. Unlike lighting actors in movies where the characters are in fixed locations and viewed from a predetermined angle, lighting the characters in *Half-Life 2* required them to look good from any and all angles. The team had the game actors lit from lights that existed in the world and in some cases it was necessary to add “fake” lights that float in space for when they moved into other spaces of the level.

“Once a scene was working well as a radio play, we would plan out the visual highlights of the scene. This would consist of one or more unique animations that would not only give the scene visual impact, but would also inform the player about emotional undertones and relationships of the characters. One of my favorite examples of this comes when we return to Kleiner’s lab later in the game and Alyx and Dog are reunited. I knew this would be a great place to not only have a cool animation of Dog running out and swooping Alyx off the floor, but to also show the strong bond between Alyx and Dog and how much she misses her Dad.” - Bill Fletcher



“We really wanted the player to believe that these were real characters living in a real world, and so we worked hard to have them physically interact with each other and with the world around them as much as possible. For example, we wanted our characters to be able to shake hands and hold each other, or to pick up an object and hand it to the player. This proved quite a challenge because of the precision required in both animation and map mechanics, but before long we were able to pull it off. The impact these interactions had in our scenes was significant; they greatly enhanced the believability of the characters and the world.” - Jake Nicholson



"After we'd discussed the script and planned out the scene, we'd typically sketch out the action in the level editor, setting up all of the major marks for the actors and implementing the initial logic in a rough version of the map. Working rough allowed the whole team to visualize how the scene would work, and where adjustments would be needed to take account of the player. When the scene was roughly playable, we'd tweak it and make cuts based on how well it was working. Once all of the dramatic components were working in the engine, an animator would work out any relationships between actors and other objects in the map, and then we'd solidify the timing and logic on all elements of the scene. At this point, the map would go into playtesting and a cycle of responding to feedback from those sessions." - Matt Wood

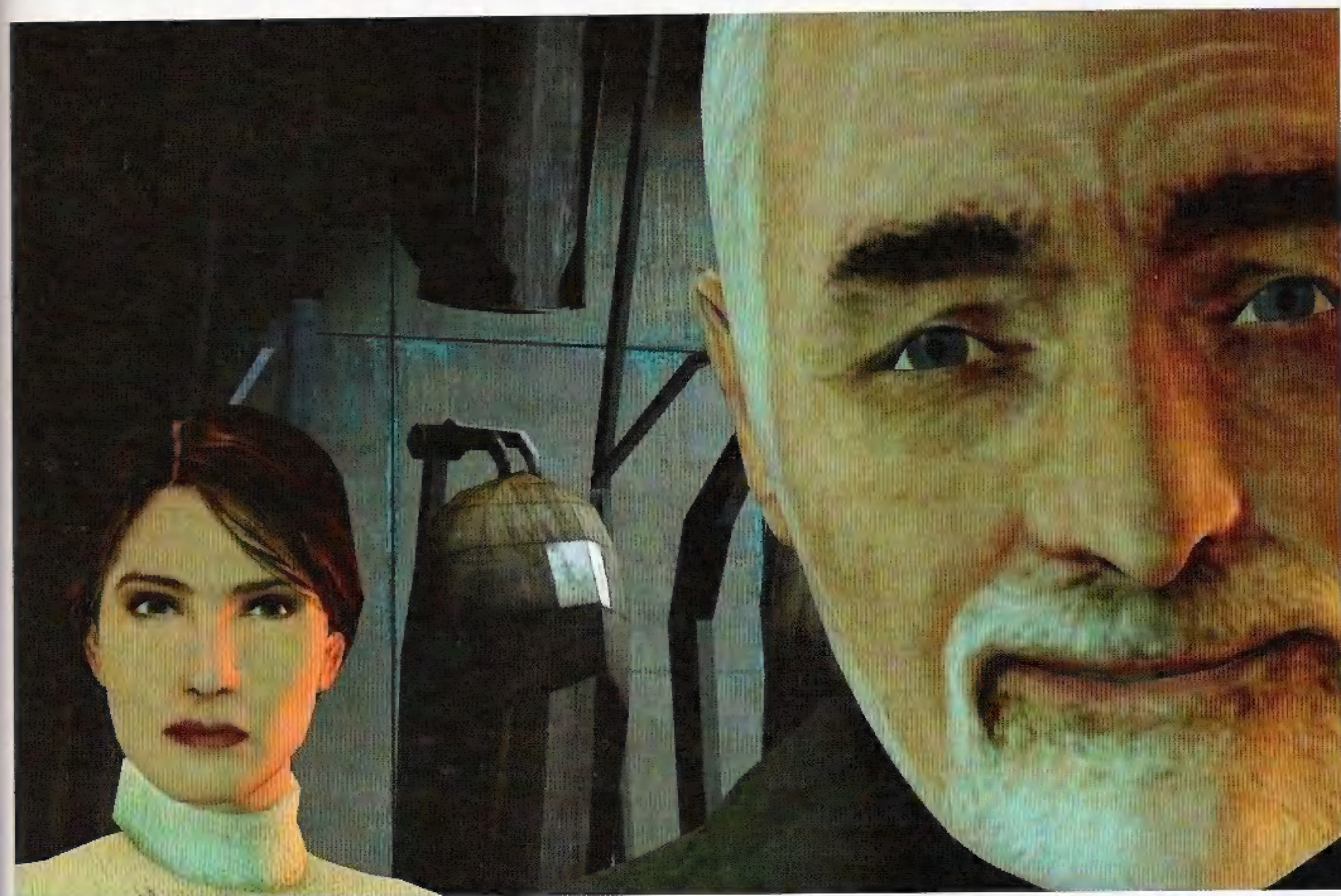
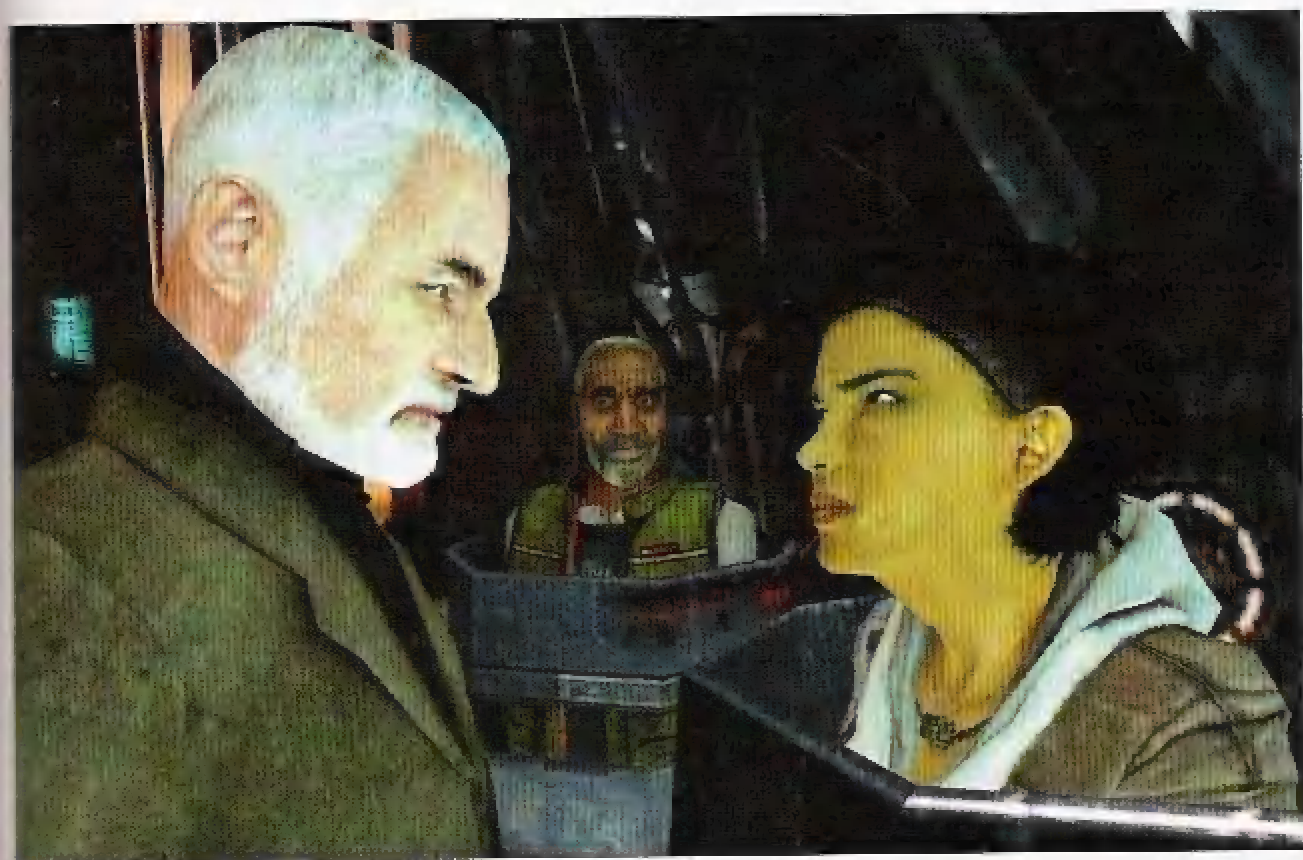


"The last scene of the game, affectionately called the 'Breenscene,' is also the last full-scale scene the choreography team worked on. It's also the only one in the entire game where every animator worked together. In some cases, one animator's work would be playing on top of another's work while a third did the facial animations. It was really amazing watching the scene evolve—loading up the level to check the work you had just done and seeing that someone else had just added to the scene. Every day there was something new, and with each layer added, the characters really came to life. It was a true team effort and out of it came my favorite scene in the game."

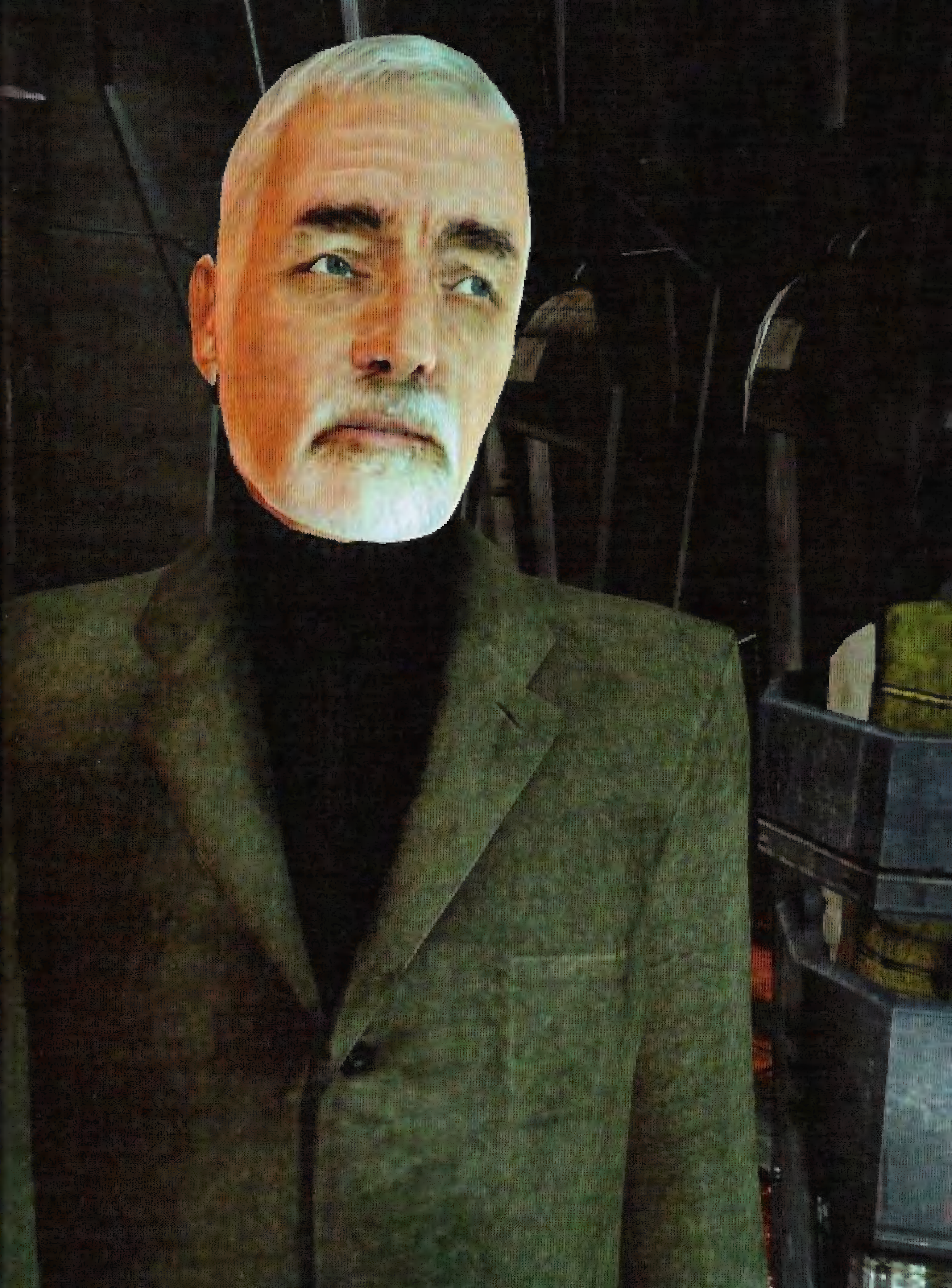
- Miles Estes

"We had a strong sense of Doctor Breen's background and personality going into the studio, but Robert Culp took a very active role in pushing the character the rest of the way. He would suggest small changes to the line readings—things that didn't seem to matter much until you looked at them very closely and realized they were critical. He really got involved in making the character his own. When we did the final sessions and recorded the final scenes, there was enough of a creative partnership that Culp was able to take Breen's performance somewhere we really hadn't envisioned originally. This turned out to be the core of Breen's character. It wasn't something you could put on paper from day one. It had to develop through the relationship with the actor, and at some point they felt comfortable taking the same kind of risks we were trying to take with the whole game. If Breen comes off as more than the standard Big Brother arch villain, it's as a result of so many creative people pushing this fictional type past the boundaries of cliché."

- Marc Laidlaw









Half-Life 2: Welcome to City 17

.05

The story of *Half-Life 2* began as a stack of index cards bearing nothing but the names of potential places for gameplay. Initial visions of the game were literally globe-spanning, taking Gordon Freeman on an epic journey from an icebound ship to an undersea base; from Washington, D.C. to the Middle East; from a vast “Scrapland” littered with the remains of the world’s armies, to an alien fortress city. But as the story came into focus, the emphasis shifted toward a tighter, circular path, and the major environments were narrowed down to a mere dozen or so. The immediate design goals were twofold: to create a consistent and strikingly original visual universe, and to define a distinct *Half-Life 2* look and style. By adding depth and history to a realistic fictional universe, the *Half-Life 2* art team gave birth to a frightening new world: City 17 and environs.





Tea

SOUVENIRS

A story fragment written and handed out to the *Half-Life 2* development team for the purpose of conveying a specific sense of atmosphere and general ideas for locations

NOW ARRIVING: CITY 17

Phosphenes flare across his eyelids. Hisssss of decompression. And then a sudden chill.

Chill...at least it is a sensation. He has felt nothing for...how long now? Has he been sleeping? Even in sleep one imagines sensations: sights, sounds, tastes. But for Gordon Freeman, for so long, there has been nothing. Not even sleep. Something deeper. Darker. Something so numbing that this brush of icelike vapor feels like the warmth of dawn.

Brighter now. Something moving out there. Someone. More sensations joining in the mix. Pain flooding back into his limbs. He would rub his hands, rub the feeling back into them, but he cannot be sure of their location. It's not completely reassuring to know he has a body into which this pain can creep. Less reassuring is the voice that crawls inside him, stealthy as the hiss of icy steam:

"Rise and shine, Gordon Freeman. I do believe I've kept you waiting long enough."

That voice...and somewhere, a blurred shape emerging from the darkness. A withered face, narrow eyes, a visage that seems simultaneously paralyzed and possessed by erratic tics that hint at extreme senility or neural damage. It floats in the vapor, blurred at the edges, seeming insubstantial. He has heard the voice somewhere before...somewhen...

"Ten years, Mr. Freeman. It won't seem that way to you, of course. But ten years is a long time. Long enough for humanity to swallow its pride and begin to accept its common fate. Long enough for your fellow man to develop callouses against the master's collar. Long enough for the first scars of whiplash to begin to heal. Long enough to forget how things used to be.

There was a ticking sound now, a low drumming clatter. The voice was beginning to fade, the face receding. Sensation solidified into substance.

"But you won't have forgotten, Mr. Freeman. You still remember how the air used to taste. You remember how freedom felt. You remember...the sky."

And it was gone. A hard surface beneath him. The clattering sound sprang loud in his ears and he knew it as the sound of a train jammering over tracks.

"Hey, buddy..."

He opened his eyes. A face--not the strangely familiar one seen through mist, but a stranger bending over him. He sat bolt upright, startling the other man, his fellow passenger. Swinging around in his seat, casting wildly around him. It was a train car, and for a moment it overlapped in his memory with another train, in another time. Had any time passed? How had he come here?

"Mister, you can't ride around like that," the man was saying, watching him with concern. His voice was an urgent whisper. "Where's your mask? Take one step outside without it, you'll be coughing up bloody foam. It can kill you that fast. Here, look, I've got a spare. Can't be too careful. I had one fail on me once, and I've carried an extra ever since. Took some real damage that time. I hope I don't get in trouble for this, but you need it more than I do. Come on...train'll be coming into City 17 any minute now. Get this on."

He found he could hardly raise his hands. Life was slow in returning to them. As he tried to get his bearings, the stranger slipped a mask over his face, let the straps fall tight behind his head. A taste of stale carbon, and a moment that felt like suffocation. Then he began to calm down...reminded himself to think, study, plan his moves. Gordon peered out through the slightly rounded goggles at the dilapidated car.

Torn seat cushions; dingy light fixtures, half of them burned out; the floor strewn with cinders and sawdust and crushed cigarette butts; brushed aluminum panels showing marks of peeled-off advertisements. Here and there were posters of a solemn face, owl-eyed, watching over the passengers. Always the same expression. Always some variant of the same brief message: THE CONSUL SAYS...RELAX. THE CONSUL SAYS...REPORT.

"There you go."

The stranger fell back in the opposite seat, across the car, looking relieved and smiling slightly. Beyond him, the windows opened onto a blasted landscape. Wrack and ruin, desolation, shattered shards of a half-known landscape that only partly resembled anything he had seen before. It was as if the world he had known, the former world, had been lifted up entire and dropped from a great height. Crushed buildings; teetering spikes with frayed wires dangling from them. Fat, bloated trees that seemed to snatch and sniff at the train, as if sculling dusty plankton from the slipstream.

"Name's Samuel, by the way. Samuel G-11789RF, if you want to be formal. Came through here, saw you laid out like that on the bench, I thought you'd already bought it. Don't know how they'd let you on the Express without a mask anyway. You must've been working in a dome, right? Out in the Waste? We were wondering why they'd stop the Express out in the middle of nowhere like that--never seen that before. Are you from City 17 originally? I got my Notice a couple days ago: Shift to 17. Same old game. Shuffle the population, keep 'em confused. Spent my last trimester in 49. I've never been in the same zone more than six months. 17's supposed to be nice enough. I hear the Consul's been stationed there for the time being. Might even get a look at him in person. Some people still hate him, but I say...how can you hold it against him? It was strike a deal or lose everything, right? We owe him big-time, the way I see it. I'd sure like to see him in person. Hey...there it is. Seventeen."

Gordon shifted, looking out the window behind him. Something immense sprawled on the horizon, a shadow glimpsed through shifting gases like smoke perpetually rising from the ruins, as if they harbored a fire that could never be extinguished.

A city.

Layered towers paled into distance, located somewhere beyond the tangled sprawl of debris that made a menace of the landscape. Tiers of buildings of uncertain age and architecture rose in ranks, stairlike--a self-contained metropolis, sketched in acid mist. Beyond those, harder to see, an immense irregular spire with its tip lost in the fumes that hid the heavens.

Samuel said, "I've gotta say...it looks a lot like 49. And 40 before that. They all look pretty much alike from this distance. Only when you get into them can you start to get an idea of how the place looked before...you know. Just before."

Gordon didn't see the tunnel coming. For a moment he thought the smoke had thickened so suddenly it had put out all light; but the sound of the train closed in around them, trapping them in a tube of darkness. Not long after that, a few dim lights flickered past, casting their wan glow on a grey amalgam of broken rock and cinderblock crammed together with bits of scrap metal. He thought he saw a human femur jutting from the wall; a rounded socket that could have been part of a skull. They passed through a portal of sharpened steel, razor edged doors retracting for the train, and the walls become smooth, dark, regular. And then the wheels were screaming. The train seemed to sway on the track as it started to brake. Lights flared ahead, space opened around them, and they floated into the station.

"Now arriving," said the train. "City 17."

Defining City 17

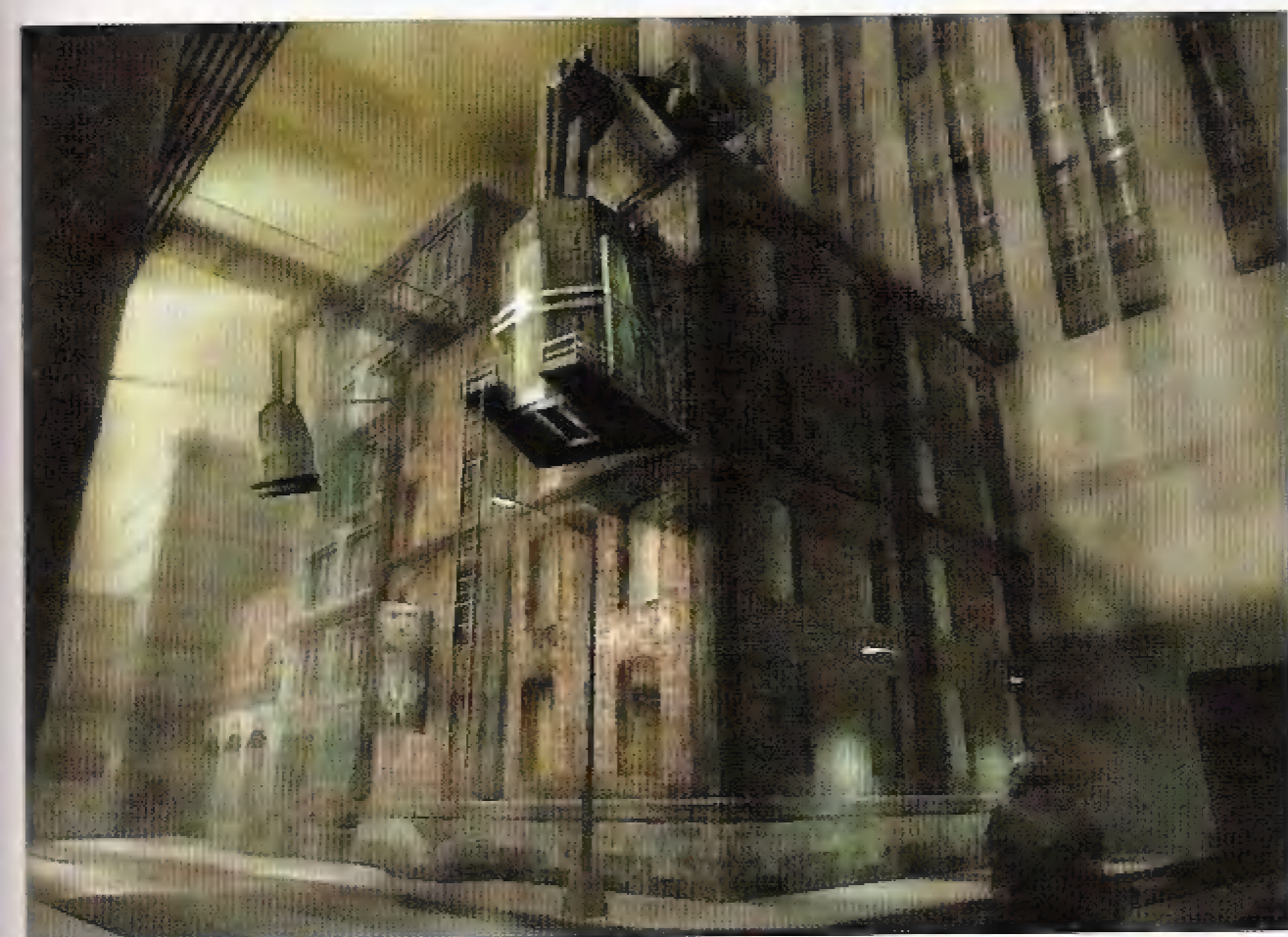
Viktor Antonov

In setting a design style for the game's main setting, the fictional City 17, the process was based on the actual evolution of some European cities. The art team began with 19th-century architecture, and on this foundation added building styles from the 1930s, 1940s, and eventually 1970s. When enough realism was achieved, it was time to add the alien touch, much like the Combine putting its own stamp on human civilization.

"One of the reasons that we liked Eastern Europe as a setting was that it represents the collision of the old and the new in a way that is difficult to capture in the United States. You go over there, and you have this collision between all of these things, the new architecture, the old architecture, the fall of communism...there's a sense of this strongly-grounded historical place. We left out the gothic themes associated with Prague and vampires and looked into a different aspect of the region."

- Viktor Antonov





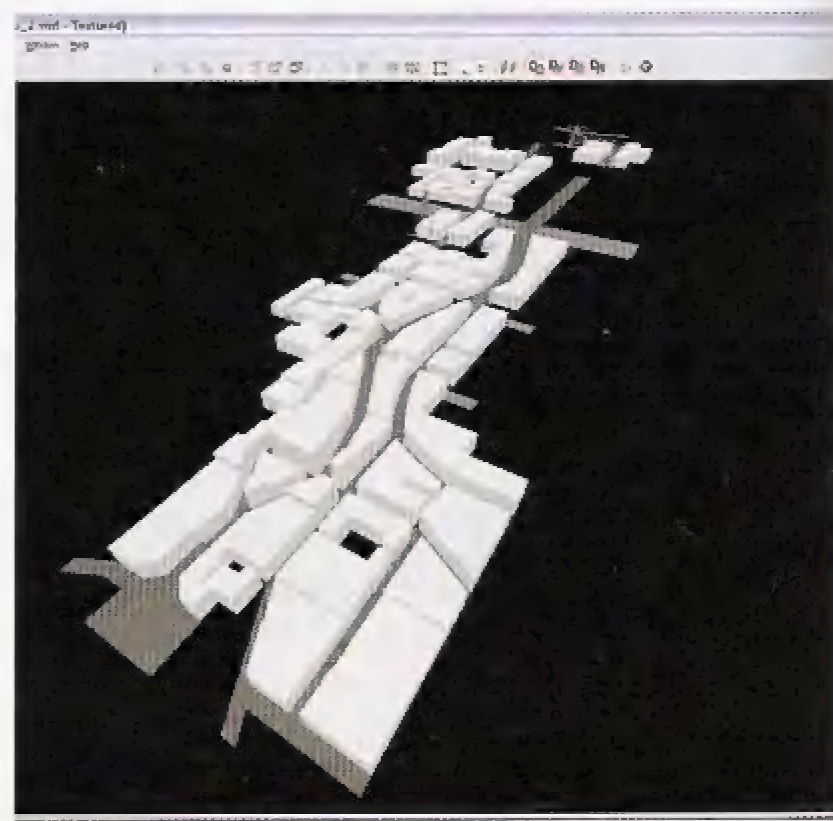
"*Half-Life* was very stylized both because of the medium and because of the way the game was built. We had to deliberately choose a level of stylization. We could have done 100 percent realistic, but that wasn't really interesting to us. We wanted to give it a little twist, an abstract and surreal feel." - Viktor Antonov



City 17 Viktor Antonov

Gathering photographic reference material from Bulgaria, Russia, and Romania was only the beginning. Nothing went into the game without being reworked by artists, to enhance the broader visual themes.

City 17, as laid out in Valve's Hammer level editor. This shows the path from the Trainstation to the Citadel, but progress in the game is never straightforward. Gameplay is deepened by imposing interesting obstacles, and forcing the player through intricate paths.



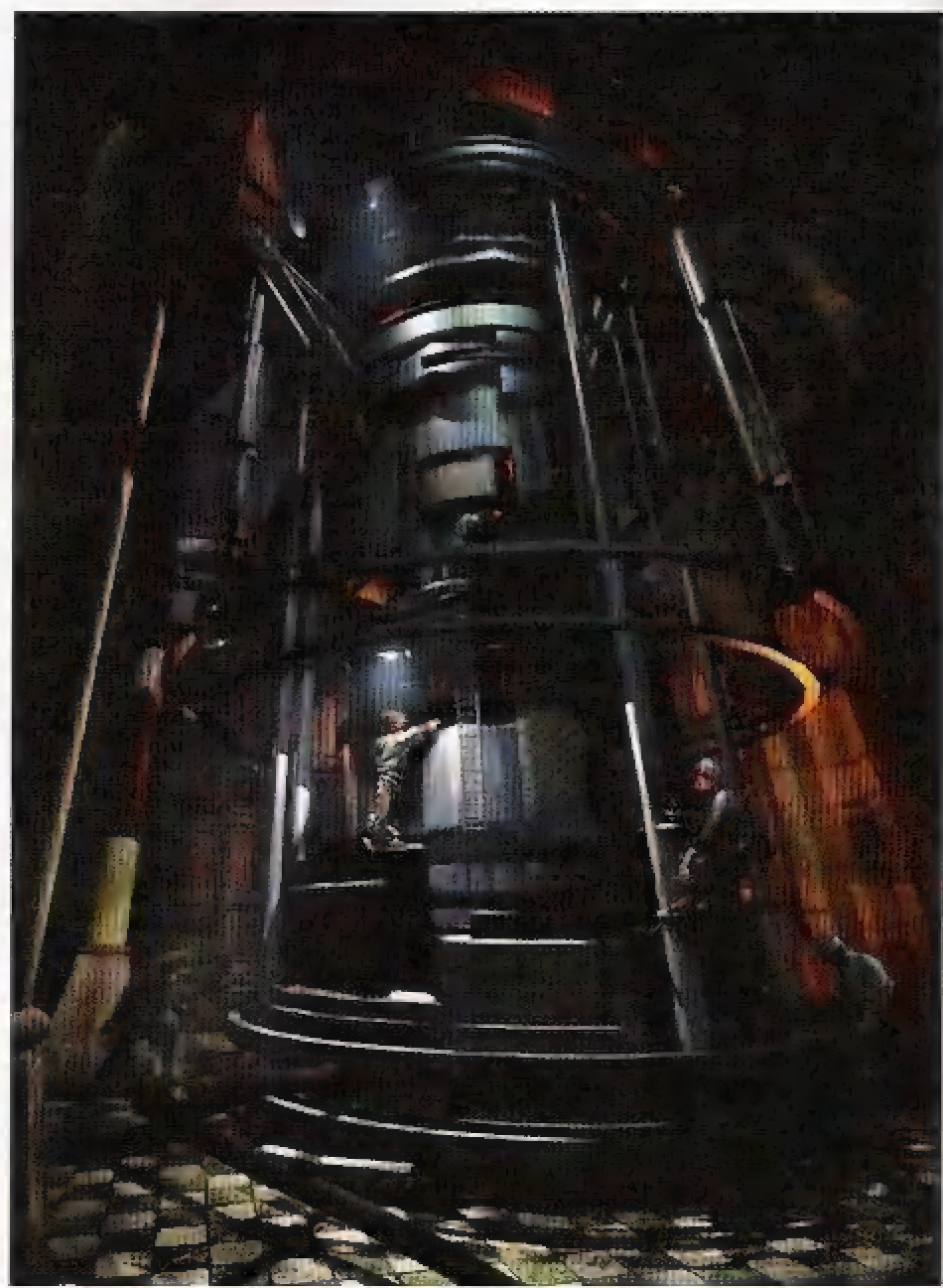
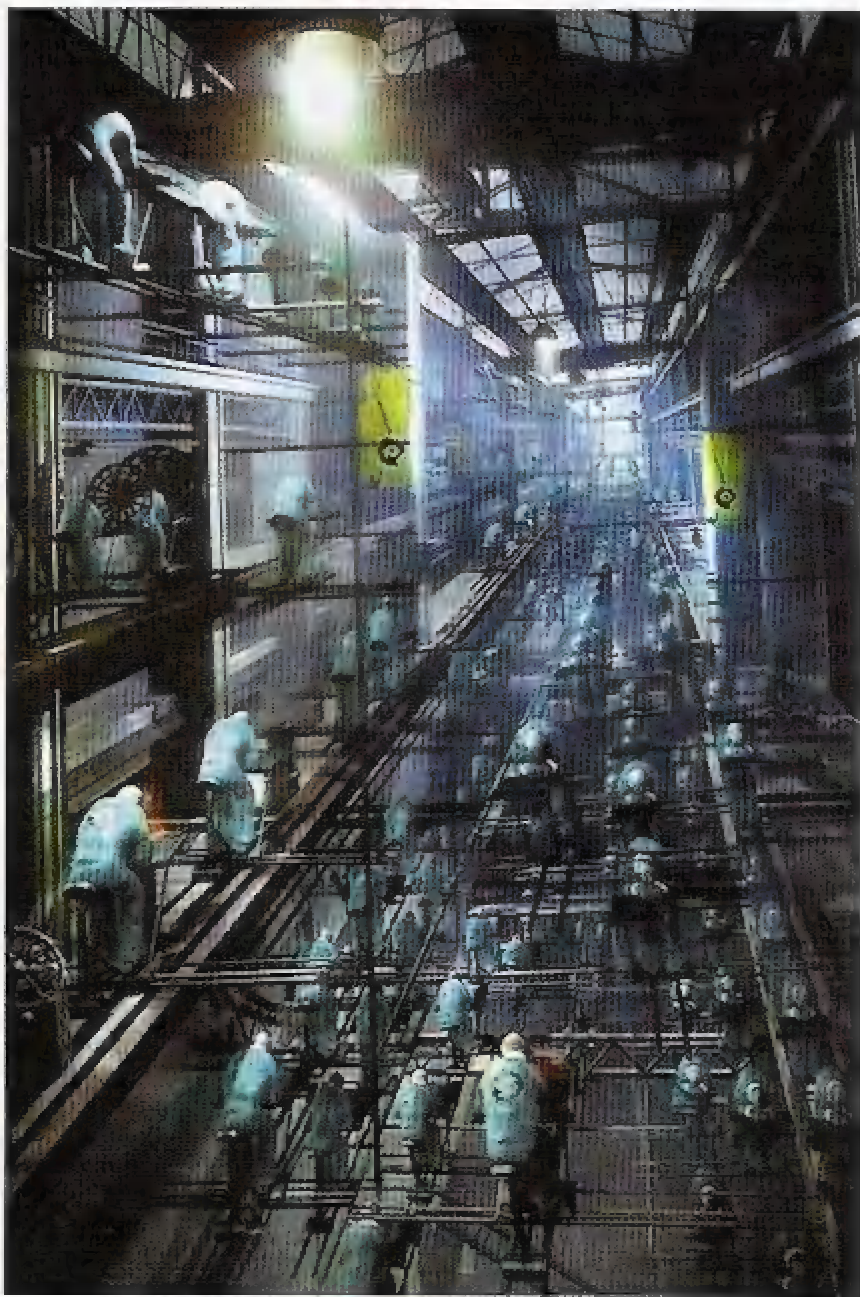


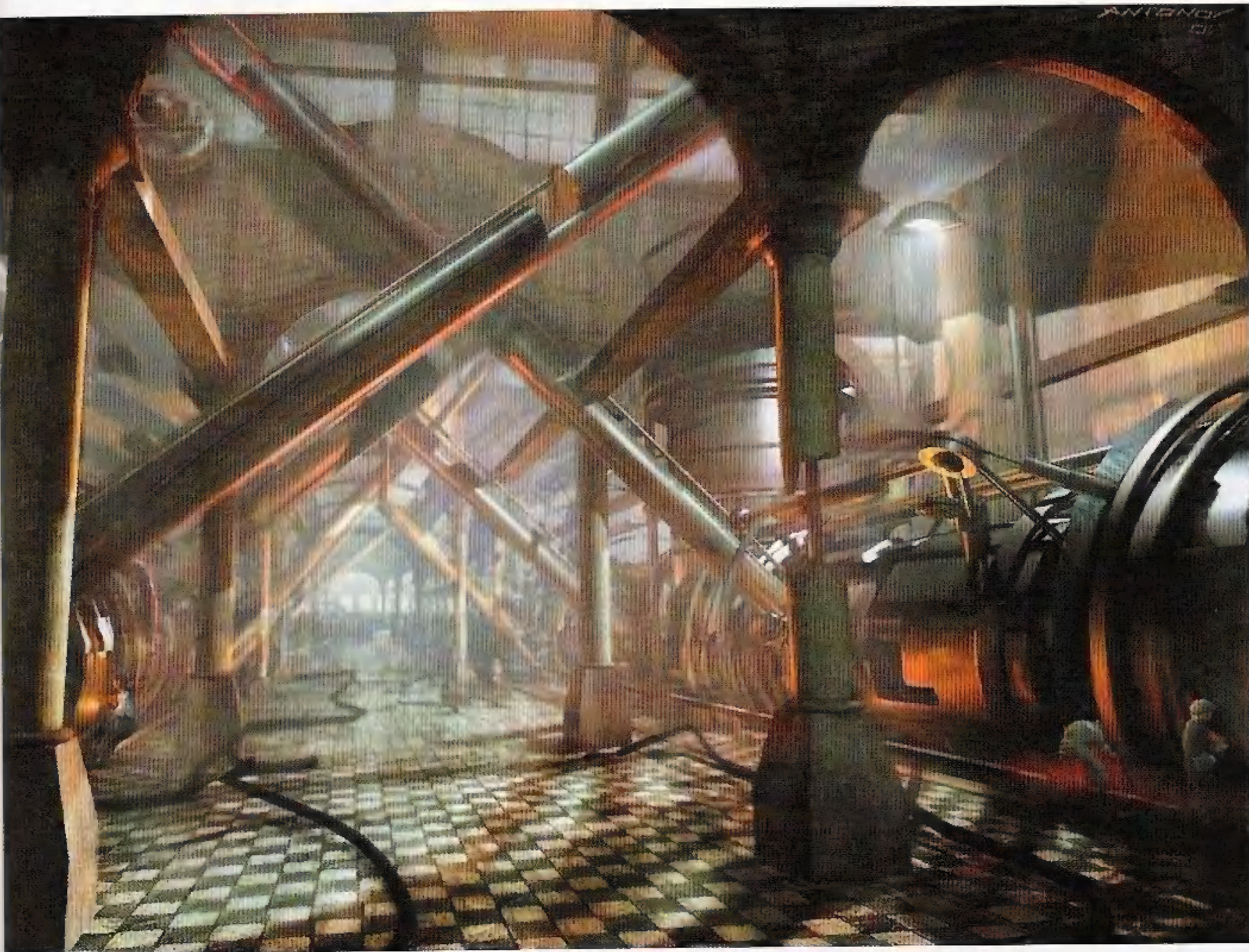
Early Glimpses of City 17

Dhabih Eng

Concept sketch (above) for a gloomy street that eventually became the Trainstation Plaza. The emphasis was on an oppressive mood, essentially timeless, but with futuristic elements. Originally, monitors for Doctor Breen's broadcasts were designed in cluster-like compound eyes (right).







Combine Factories

Viktor Antonov & Dhabih Eng

Various views of human servitude under the Combine. A vast stenographer's chasm (upper left) was an attempt to create a nightmarish working environment, but it proved bereft of gameplay, and was situated in a part of City 17 that was trimmed early on.

The Child Factory (bottom left) never progressed beyond rough prototypes. Child citizens were also prototyped at one point, but eventually it became clear that the Combine had suppressed the human reproductive cycle for many years. The absence of children became a minor theme of the game, and the Child Factory was rendered irrelevant. The Vorti-Cells (right) were used as stations siphoning power from trapped Vortigaunts as Gordon attempted to free them.

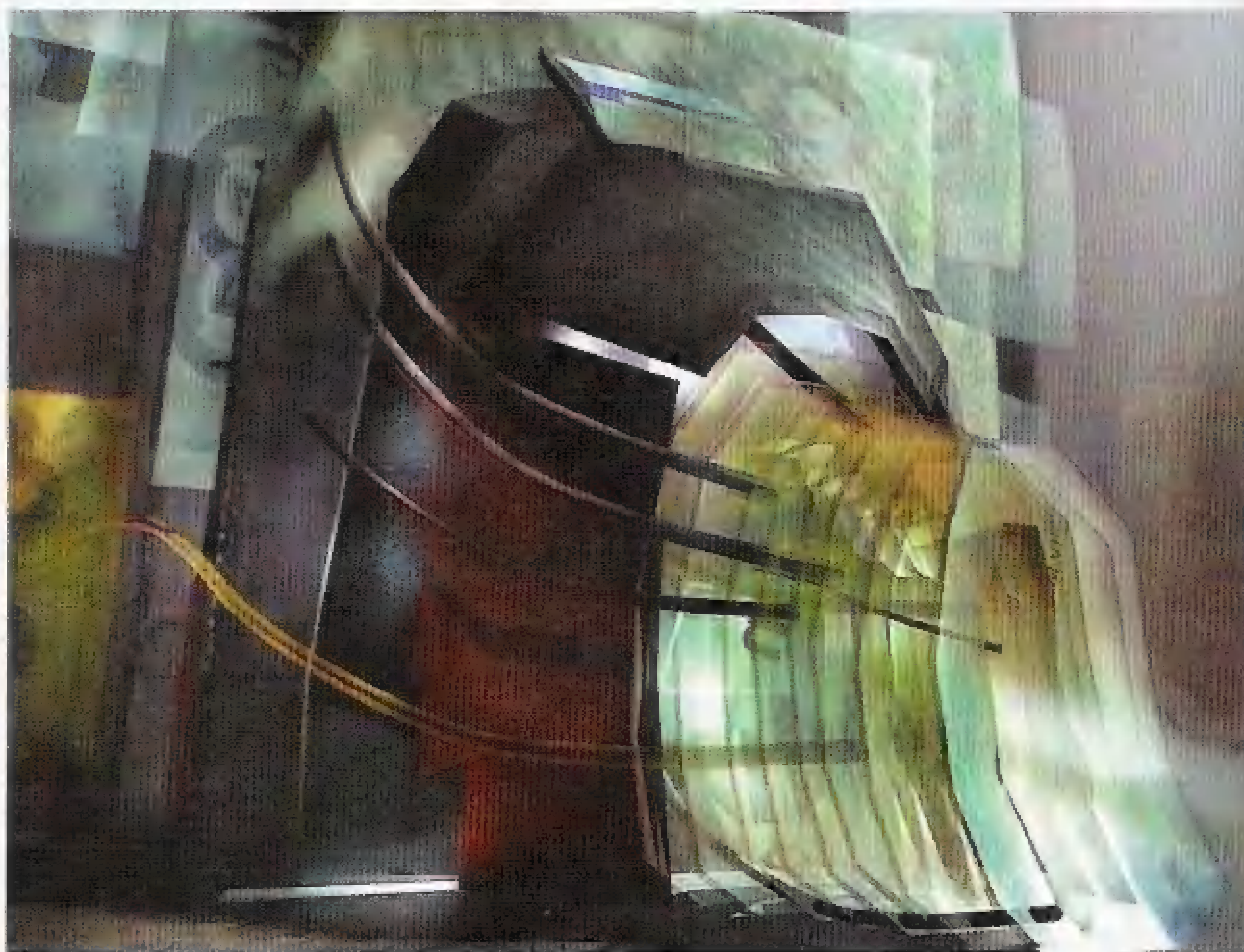




Invasion Technology

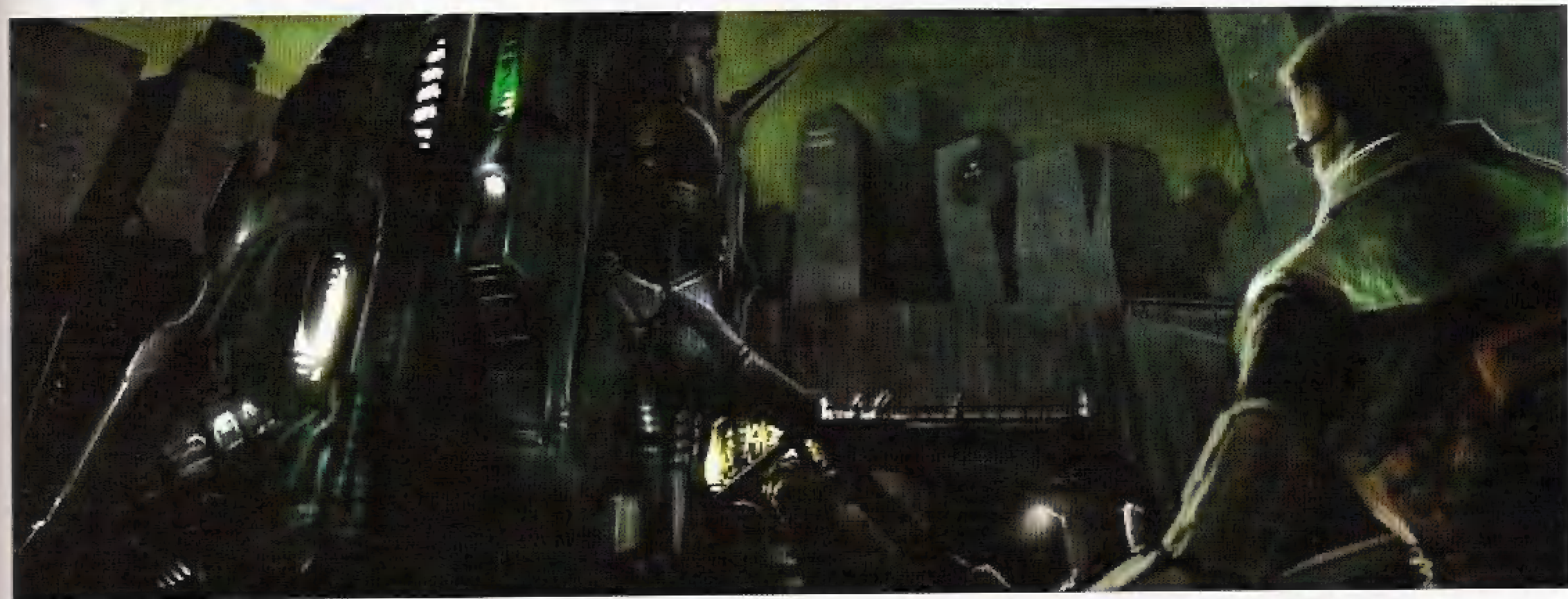
Viktor Antonov & Dhabih Eng

Artists and animators worked together to explore possible types of Combine technology, pursuing a number of smoothly animated, highly articulated machines for gates, bridges, and walls. The most notable example of this technology to survive in the final game is the array of huge Combine walls, which smash through buildings and chew up streets along the player's route.



Manhack Arcade

Originally, the flying Manhacks were intended to be under the control of game-playing citizens who believed they were playing a video game rather than hunting fugitive citizens. Like many early gameplay ideas, it sounded good on paper, but proved to be overly complex and not very fun.



An early concept of Gordon Freeman arriving at the Citadel's lower entrance



The Air Exchange
Viktor Antonov

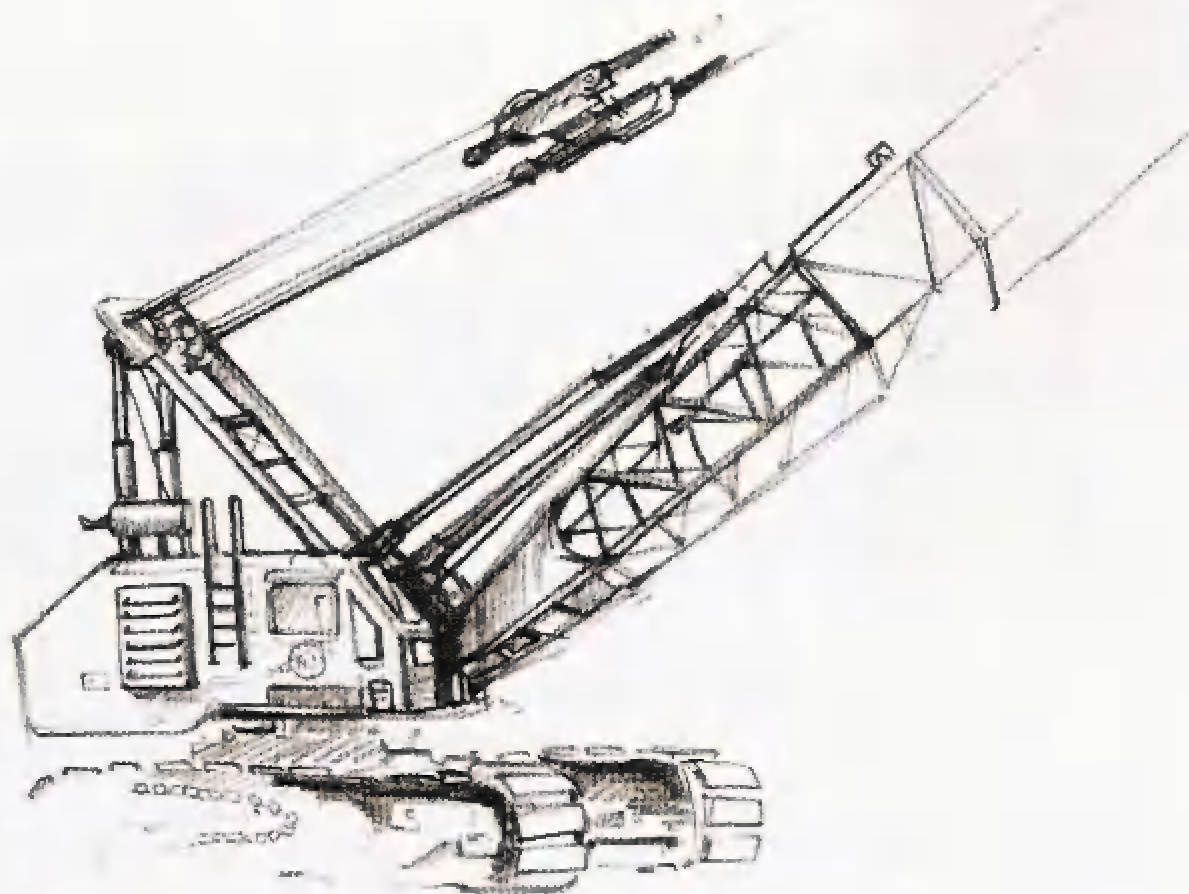
At one point conceived as the turning point for Gordon's journey, a huge atmospheric reprocessing plant was there to be sabotaged and trigger the human uprising. This stage of the game was eventually played out in Nova Prospekt.

Wasteland

Viktor Antonov

Nothing changed more in the process of developing *HL2* than concepts of what lay outside the walls of City 17. Valve experimented with concepts ranging from a vast Scrapland full of junked military machines, to a dried seafloor, with the ocean draining away into a vast teleport "drain." The uniting thread was to be a railroad linking City 17 to an outlying complex known variously as the Air Exchange, the Depot, the Gulag, and finally Nova Prospekt. While everything else changed, the railroad theme remained constant.



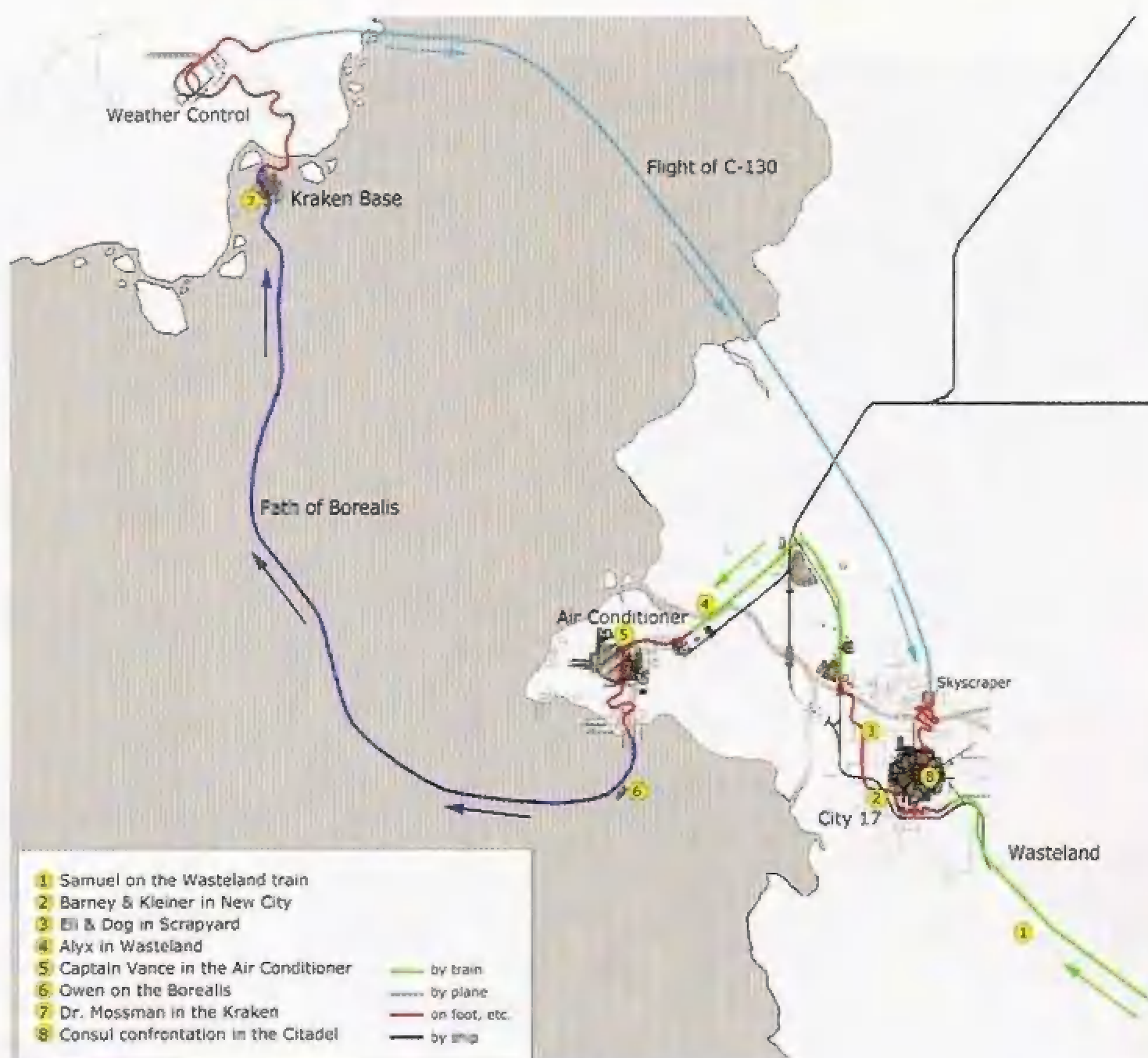


The Coast

Early resource gathering expeditions led artists and level designers to aircraft carriers, shipbuilding yards, and arctic research vessels. Some of this material ended up scattered along the Coast during the second day of Gordon Freeman's journey, but much more remains ready to be exploited in further adventures.

"When it came time to gather reference for the magnetic crane, I got my camera and a friend and I drove down to west Seattle where there are a number of them. For the crane interior, I used the inside of a bulldozer and the reference was complete." - Laura Dubuk





Striking a Balance

Viktor Antonov

A map of early *Half-Life 2* geography (above)

"There is a lot of value in refinement. There's an aggressive statement of this principle, which isn't entirely true but it's still interesting: It doesn't matter what we cut, so long as we cut it and it gives us the time to focus on other things, because any of the options will be bad unless they're finished, and any of them will be good if they are finished. The key thing is not which things we decide to focus on, but that we focus on them, and we've seen that over and over with weapons and monsters and levels. One of our worst enemies is trying to do too much, rather than narrowing our focus, and whenever we narrow it, that set of interesting problems gets figured out and interesting ways of using that creation become obvious. Doing things halfway is the greatest enemy of creativity, both on the team and for the player."

- Gabe Newell



Air Exchange Interior
Viktor Antonov

Detailed scenes from the Air Exchange. This vast industrial nightmare was prototyped, but never finalized, in order to let the team concentrate on areas that were proving more fruitful for gameplay.



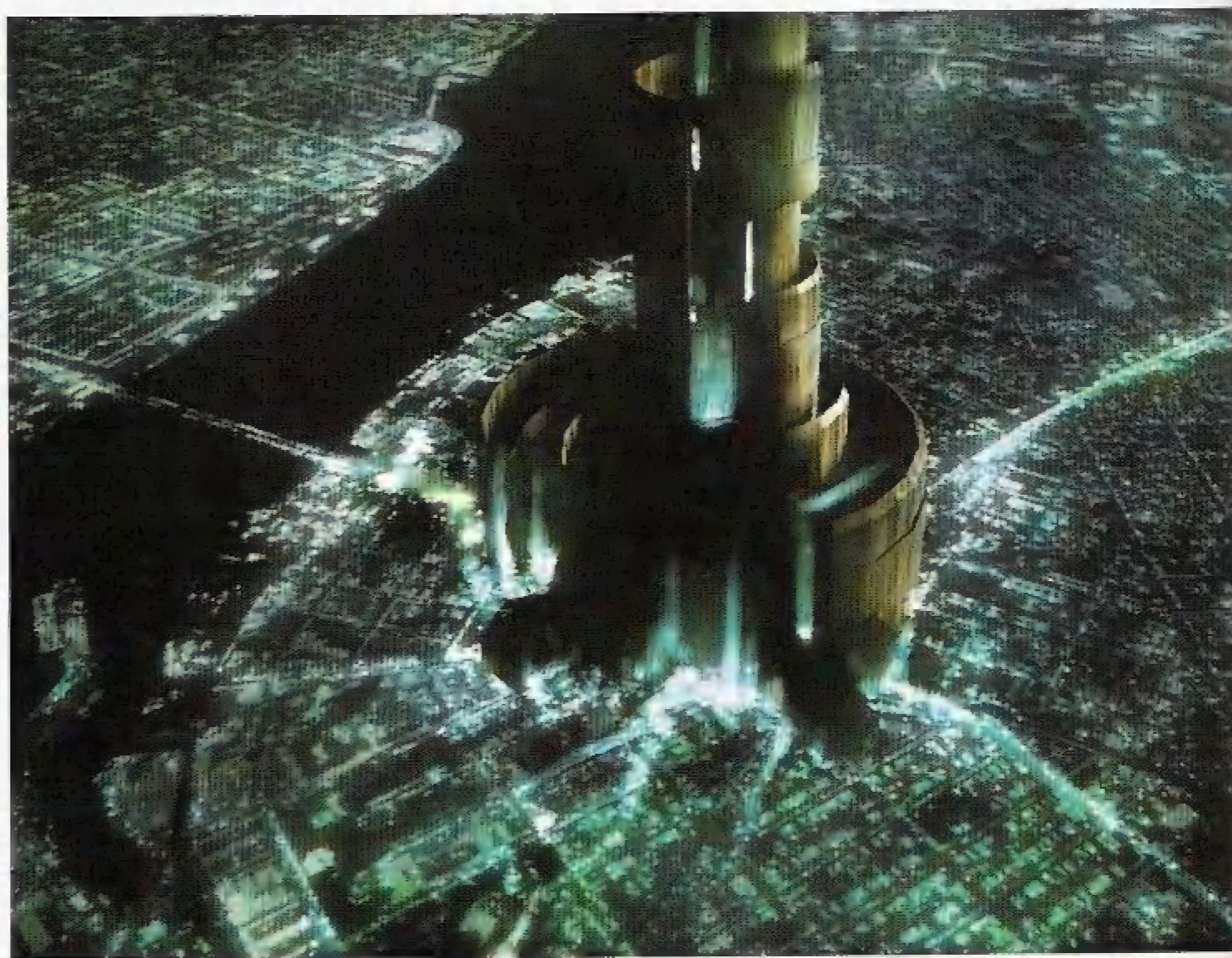


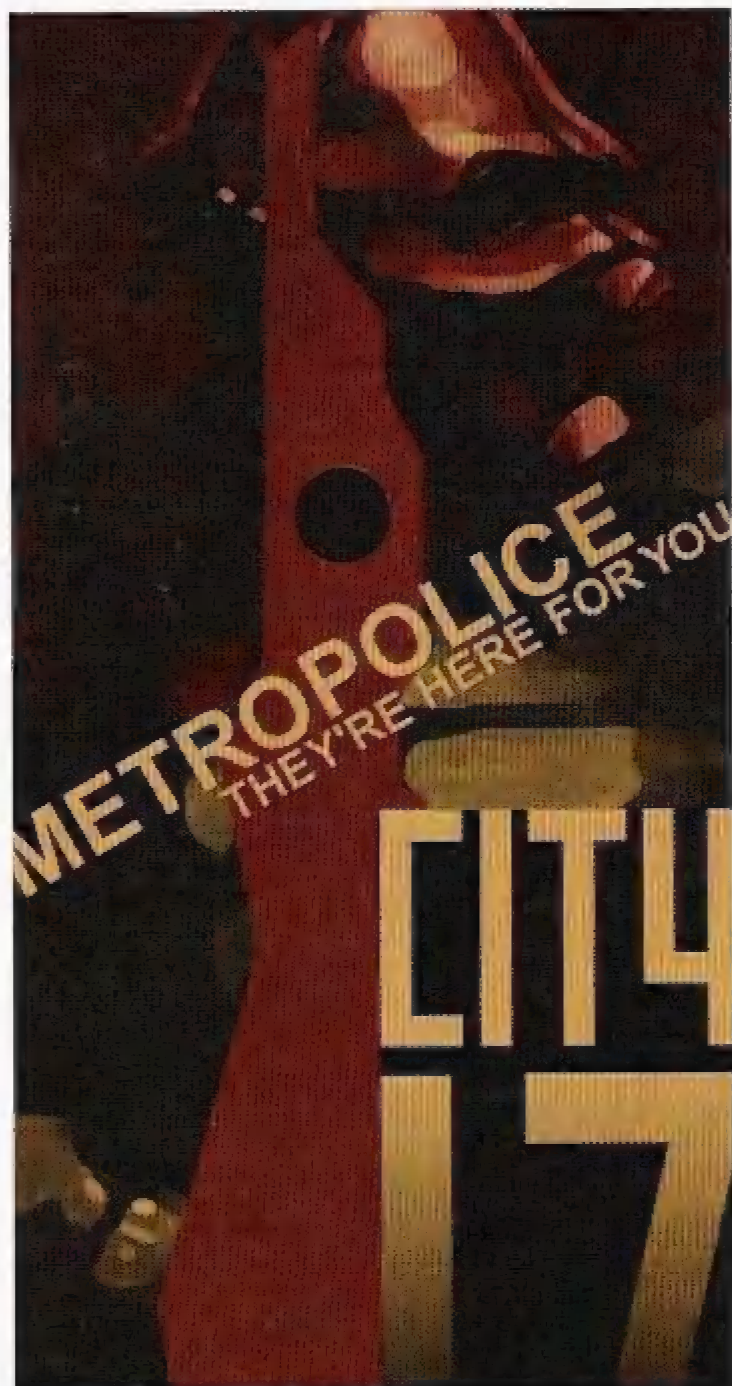


Citadel

Viktor Antonov

"We wanted the end of the game to feed directly into the beginning. From the first seconds of the game, we wanted the player to see where his journey would take him, so that when he finally got to the Citadel, he would have the strongest possible relationship with it. We had failed to do that in *Half-Life 1*, and we were determined not to repeat our mistake." - Marc Laidlaw

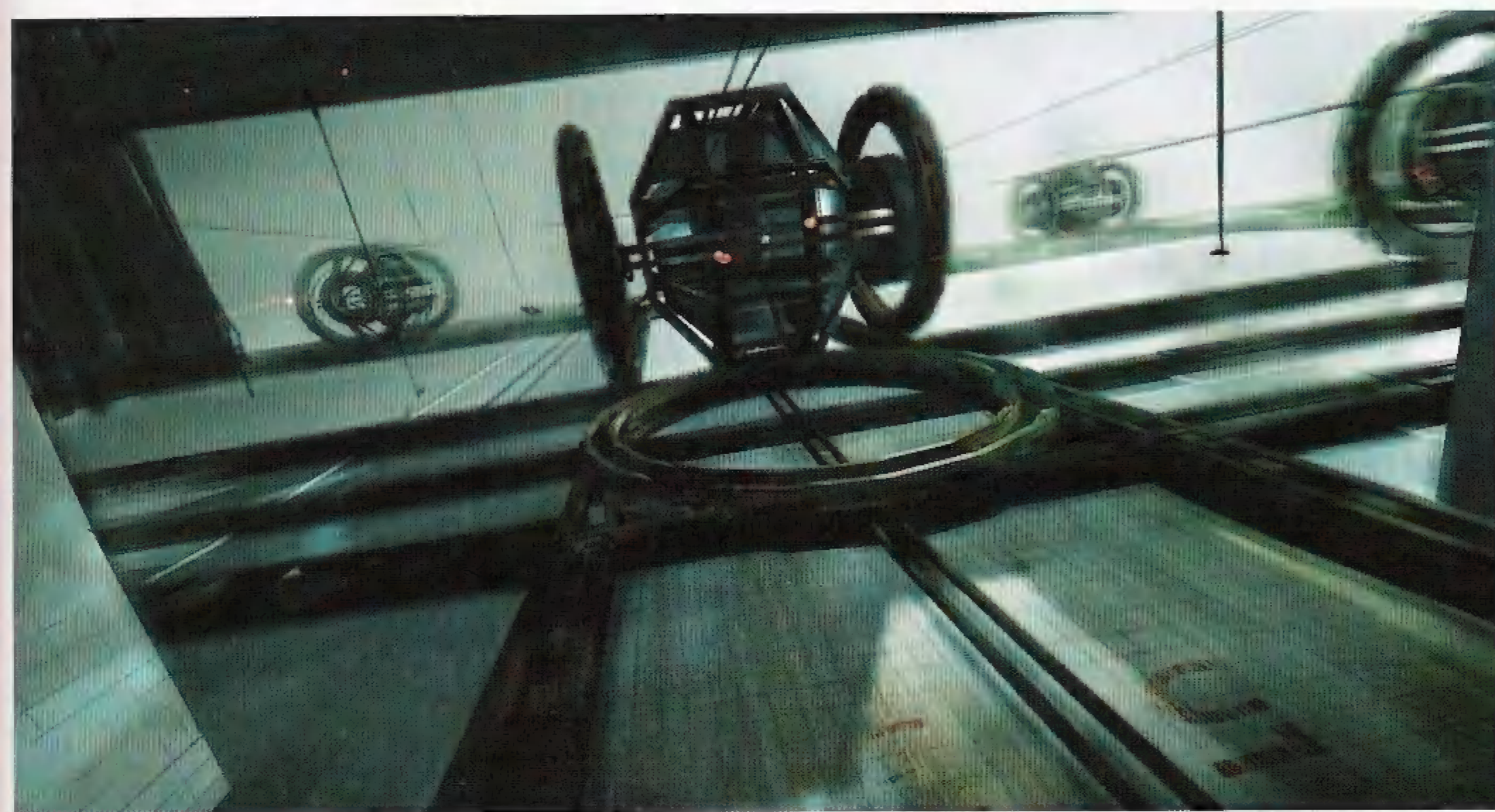


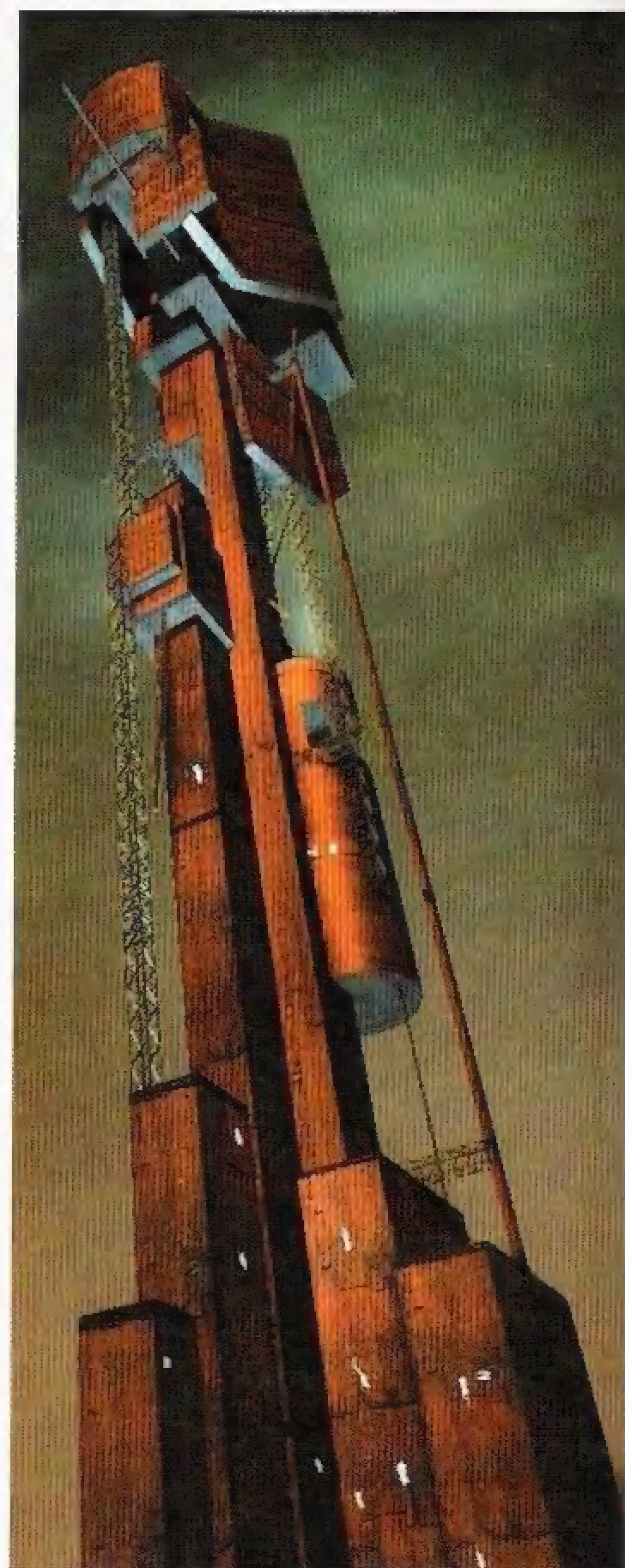
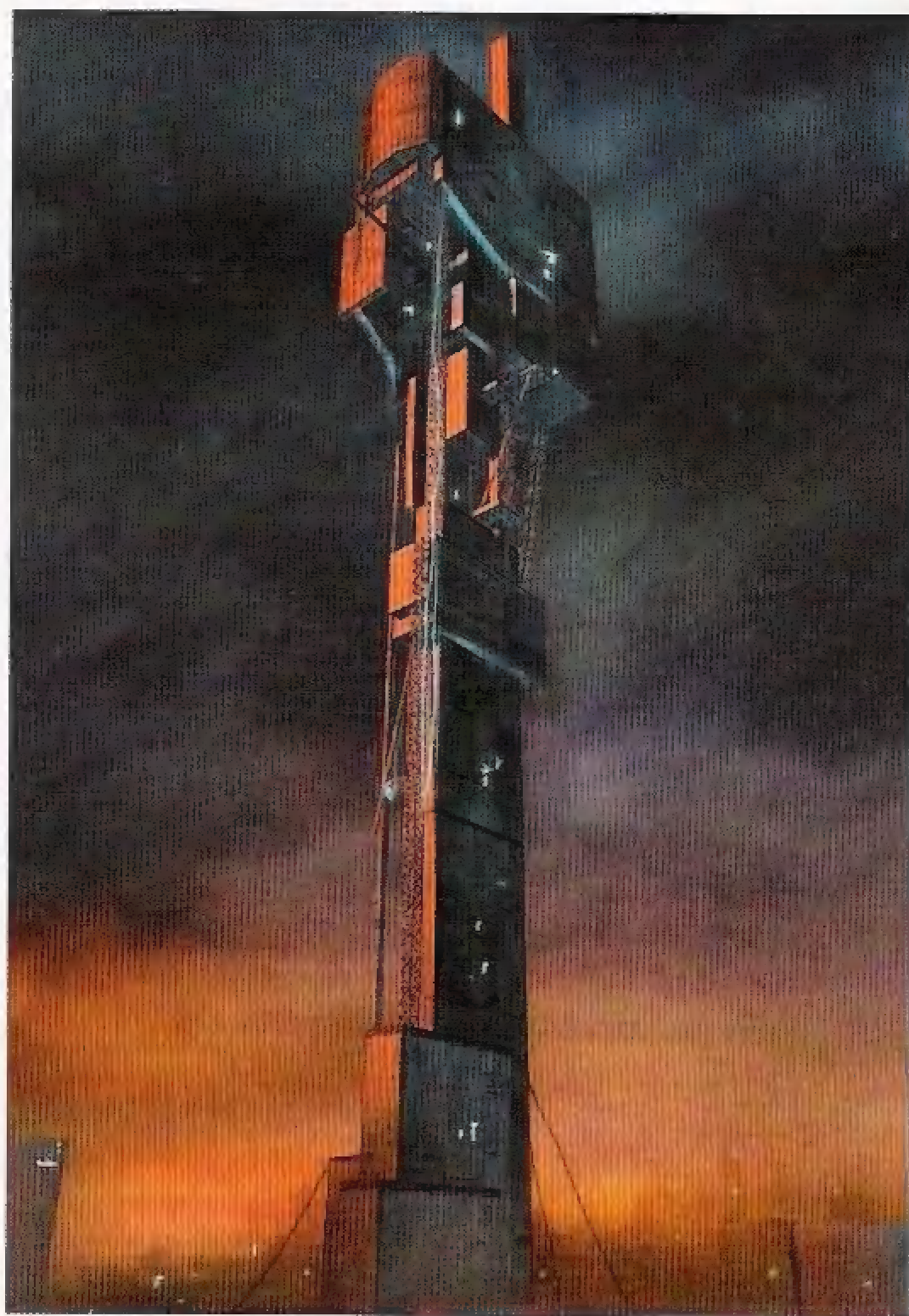


Combine Propaganda

Randy Lundeen

"We made periodic attempts to create and scatter Combine propaganda throughout City 17. It was eventually decided that most of the posters detracted from the atmosphere, and were doing the work of a sledgehammer where tweezers were required. Also, it was fairly obvious that the Combine didn't need to rely on subtle messaging to achieve its ends." - Randy Lundeen





Combine Technology

Viktor Antonov

Several views of an Air Exchange industrial tower show early attempts to develop a distinctive design language for the Combine, which would be echoed in all its other creatures. Note the use of asymmetry, an unsettling approach to pattern, and a few massive shapes that bespeak terrifyingly efficient mass production facilities. From a gameplay point of view, the player was intended to fight his way to the top of this tower, then take a plunge into a tiny pool of industrial solvents at its base.



A story fragment distributed to the *Half-Life 2* team for design inspiration. This sequence took place in an arctic base that was cut early in the project.

WEATHER CONTROL

The first they knew of the Combine's arrival was a distant roar. Gordon looked to the sky, clearer now than it had been since his arrival, the thready strands of greenish vapor finally receding, actual sunlight beginning to strike through. The canyons of ice through which they steered the battered Bradleys threatened the first faint glimmerings of glare; he'd need sunglasses soon if it kept on like this.

But with the heart-lifting glimpse of the sky came the reminder of death—more of a promise than a reminder.

Slicing through the mists, so high that at first he thought them birds, came a swarm of ships. Light, swift aircraft passed across his vision long seconds before he heard the shock of their passage. The clouds swallowed them up. For a moment all was still. The Bradleys rumbled on, but the soldiers, Vance's men, grew silent and shifted their grips on their weapons.

A second later, they were engulfed in an explosion of ice. A canyon wall blew into glittering shards. Gordon saw the Bradley nearest to the wall hurled spinning across their path; it sank head-on into the opposite wall. Another explosion, this one somewhere behind, deafened him.

He could see the soldiers shouting, but heard nothing but the ringing. He knelt instinctively, trying to find some protection, and as he did he saw another of the Combine airships sweep low over the canyon, directly overhead. Something hit the ice in front of them. The men who noticed hurled themselves out of the back of the Bradley, as if the vehicle itself might offer cover. Gordon flung himself to the snow, and then was flung by the force of the blast.

When he regained his senses, he saw the other men struggling to free themselves from the mounded snow. A few did not move. Up ahead, a greyish figure covered in ice made a bold gesture, beckoning them forward. The soldiers staggered forward, as the surviving Bradleys continued to rumble up the canyon toward their destination. He caught a glimpse of Alyx's face in the back of the rearmost Bradley, and was surprised by the sense of relief that touched him then.

Tensed against further strikes from above, Gordon scrambled toward the ice-covered soldier. As he drew closer, he saw it was Vance himself, rallying the men, shouting orders he could barely hear. But the squad seemed to know what to do. Spread out across the width of the canyon, they hurried on, skidding and sliding on the ice. The canyon opened out, and around the next bend Gordon got his first sight of the Weather Station.

It was a low dome, jutting with antennae and radar dishes, tiny red lights blinking above them. Around the dome were more structures, built low and painted white, almost indistinguishable from their surroundings. The whole thing was sprinkled with snow, like powdered sugar, but it was hardly a pristine image. There had already been fighting here. Smoke rose from a crack in the dome. The soldiers stationed inside the station had massed against the Combine operators as the news of the uprising spread; the fighting had torn it apart from within.

Vance caught sight of Gordon, grabbed him by the arm, and thrust his craggy face close to Gordon's ear: "There's a cargo plane coming for you, Freeman, but god only knows how long it'll take to get here—if it makes it through at all. Once we get you aboard, you can take those chips back to City 17. But we've got to last that long. We'll hold off the Combine as long as we can from out here, then we'll fall back into the Weather Station. I'm not anxious to get holed up in there, sitting targets, but we're awfully damn exposed out here."

As if to underline his words, a shadow fell over them. Gordon looked up to see an enormous ship crest the edge of the canyon, so close that it seemed to be crawling across the ice.

"Jesus, that's a mech carrier," Vance said. "I didn't think they'd be here this soon. Get moving!"

To Gordon's horror, the carrier drifted to a spot between him and the Weather Station. He expected it to settle on the ice, blocking their route completely. Instead, a hatch gaped in its belly, and a huge metallic parcel was lowered to the snow. As the carrier lifted, the package opened itself, metal unfolding into a nightmare that by now had grown familiar. It was a mech, one of the same that had chased him across the wasteland and harried him and Alyx. It was a cousin to Eli's robot, Dog, but apparently new-minted, and still without blemish; there was nothing awkward or hesitant about its first steps.

Gordon stared at the thing in something like awe, but the soldiers shared none of his wonder. They had seen the mechs many times, perhaps even fought alongside them; but never before had they fought against one. Still, they didn't hesitate. As if they had rehearsed exactly such an encounter, they moved into defensive positions. Each man seemed to know his role. Gordon began firing at the metal shell of the thing, but without much sense of its weaknesses—if it had any. But the soldiers were more methodical. The mech began targeting them, neatly pruning men from the unit, but for every soldier it killed another one seemed to advance further in the unit's plan.

Gordon's pulse quickened when he spotted Alyx down there, in the fray. She had leapt from one of the Bradleys while the others sped on toward the Weather Station, and she was coming up on the mech from behind. She had a grenade out, primed, ready to throw. Vance shouted something and ran straight for her, and his cry must have distracted her—for the grenade went wide, exploding in mid-air to one side of the mech's "head."

The thing stopped, judging this explosive more of a threat than anything the soldiers carried, and began to pivot its heavy head to bear on Alyx. Gordon might have shouted something himself, but he was aware of nothing but Alyx standing there, looking suddenly so small, so alone, the brightest possible target in all that ice. He was running, firing helplessly at the shining carapace, running like Vance toward his daughter.

The mech's head did something, it pulsed with a faint glow as if powering up for a particularly lethal strike. One of the gun barrels swung toward Alyx, who backed away in atypical shock, as if she couldn't believe her throw had gone so wrong.

The mech began to fire, but in that instant its entire upper carapace exploded.

Gordon saw smoke rising from the direction of the Weather Station, trailing from the barrel of a huge gun located on the field below the dome. The blast had thrown sheets of accumulated ice from an installation of antiaircraft weapons. And now other guns began to spit fire and missiles, as the men from the Bradleys leapt into the bunkers and began to take on the airships.

Alyx had fallen, but by the time Gordon reached her she had regained her feet, with Captain Vance helping her up. She gave them both a brief flicker of a smile, then shrugged toward the guns. "They're going to need our help up there." She started running. She was still running when the next wave of shadows swept over the canyon, and the Combine forces—not merely advance guard—arrived in earnest.

Courtyards

"We wanted to go beyond the surface and the facades of the city, so we constructed it from its skeleton—the boulevards, the avenues, and the hidden spaces, like the courtyard on this location shot. Such secret spaces make up a lot of what you don't see when you're a visiting a city. We wanted a sense of depth in our world." – Viktor Antonov



Lighting

Lighting was as much of an engineering challenge as it was an artistic one. It was important to give *HL2* a lighting style different from other games, as Valve artists went for a subtle, diffused lighting style. Radiosity and bounced light played an important role in creating atmosphere and unifying the geometry. Material properties were used in a subtle manner and the use of specularities was very controlled.

"Autumnal light provided a gentle, soft look to our exteriors that needed to be contrasted by a sterile, artificial neon look of the interiors. Examples are the harsh crisp tunnel lights of the invaders in this location shot. That defined our light palette. We were very particular about light falloff, shadow edge softness, and light temperature, as this screenshot shows. The cold light color was also used as a story device, indicating the presence of the invaders and becoming their 'signature' hue." – Viktor Antonov



Research

"Research was crucial for this project. Once we had established an imaginary location, we had to make it real. The art department started preproduction as the developers were creating and tuning the world-building tools. There was a definite obsession with detail in the building of the world. We had a photographer do extensive research on location, where he shot all kinds of seemingly insignificant details—an example is this photo of an actual rooftop in Sofia which helped us create our rooftop area. The next image is an in-game shot of a similar area we recreated with an extra level of stylization. Here we studied the tin and terracotta and their surface properties in order to re-create them in our rooftop scene. We wanted to get the exact reflectivity and specularities of different materials in order to create our shaders. The goal was building a very specific material library." – Viktor Antonov



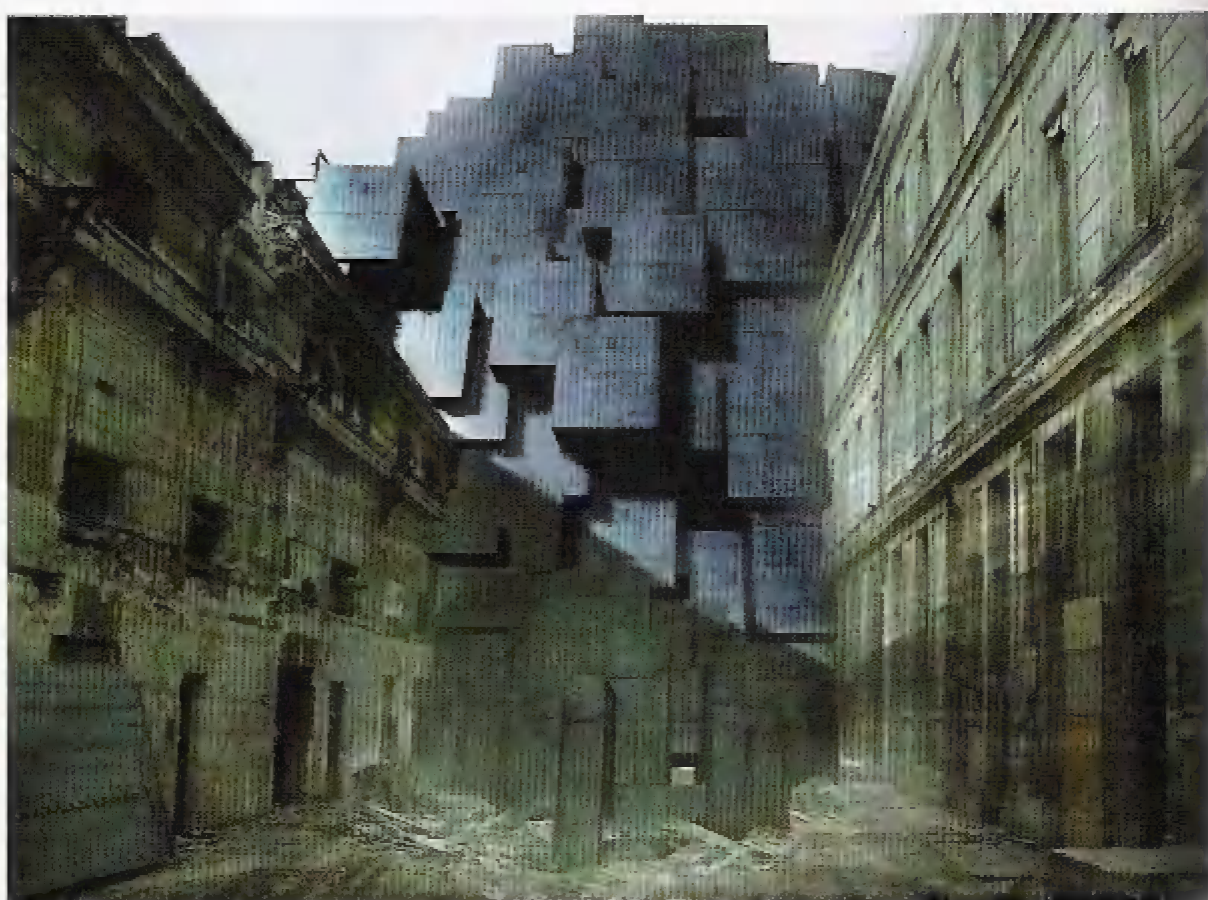
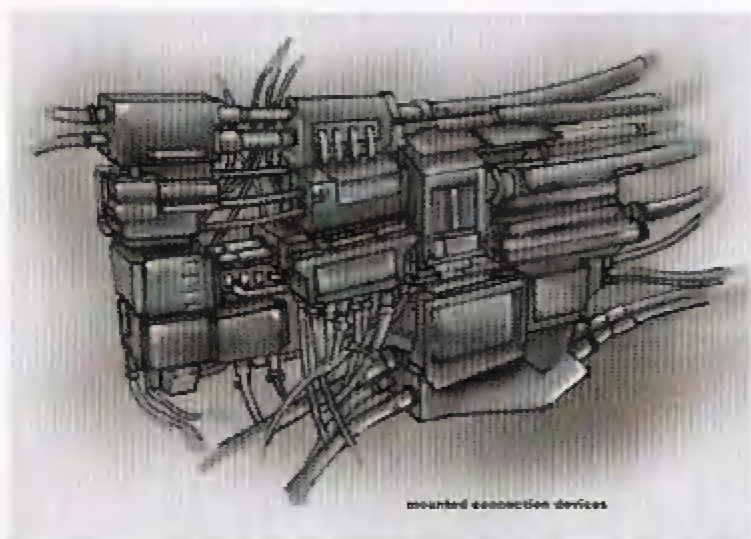
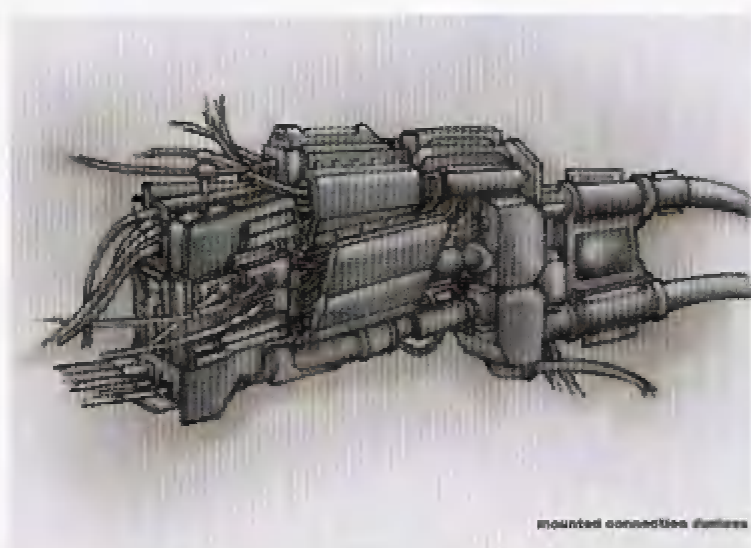






Combine Invasion

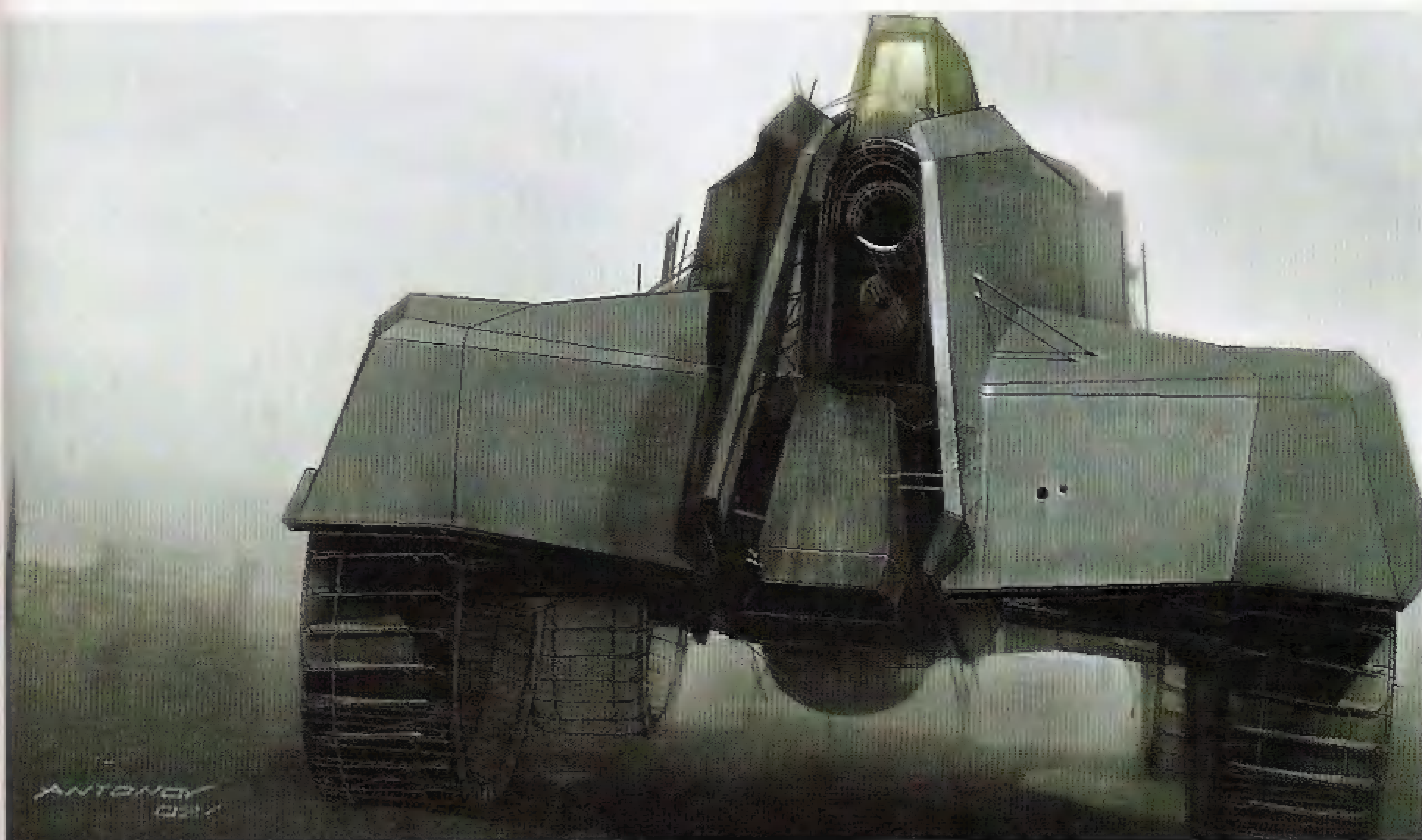
In portraying the effect of alien invasion, artists started by creating a realistic setting and then added themes to create strong visual contrast. This screenshot shows the alien technology absorbing the human city and creating a sense of intrusion and conflict.



Combine Technology

Viktor Antonov & Eric Kirchmer

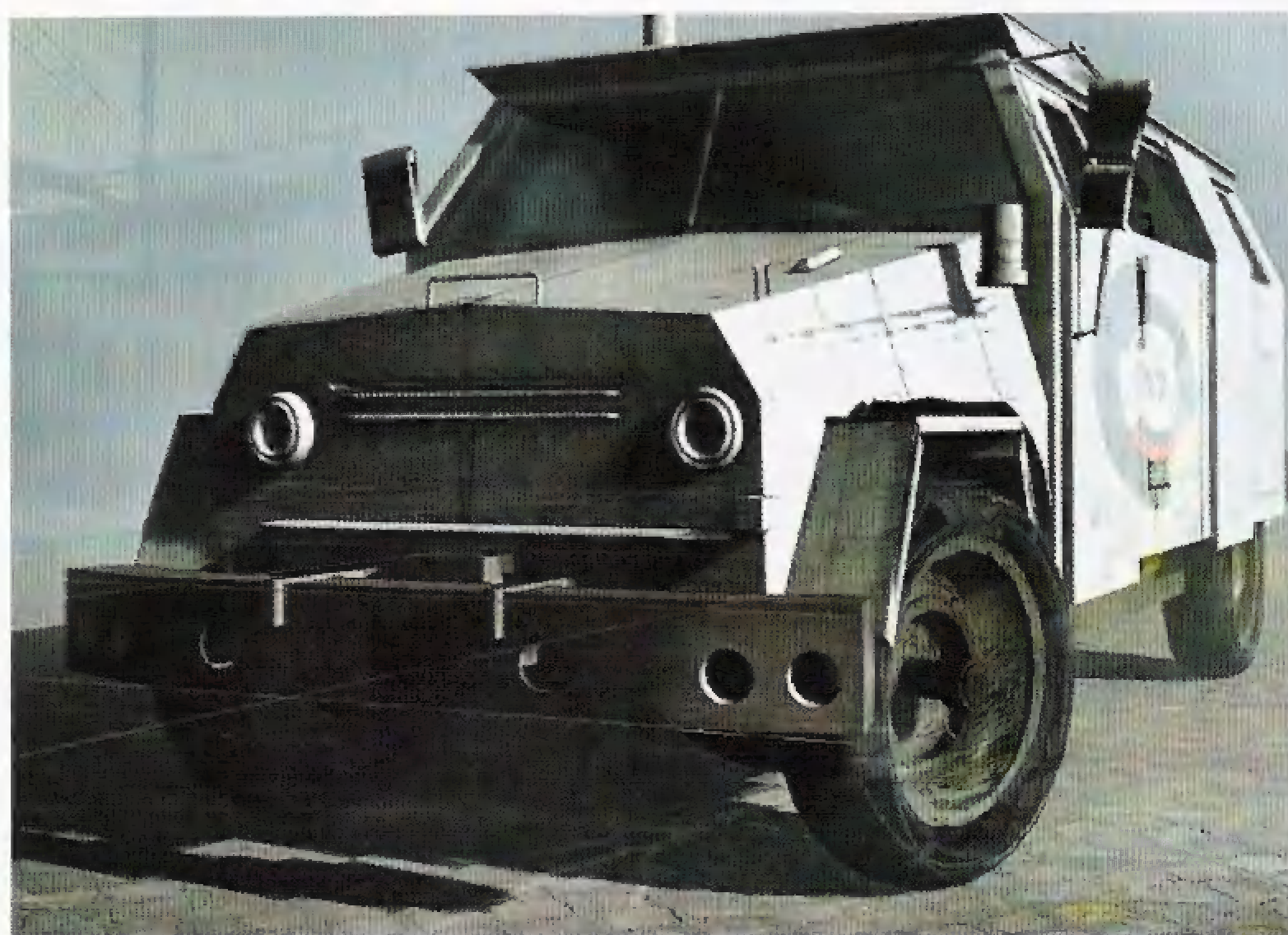
Early visions of the Combine wall had it devouring the City over the course of the game, an ominous metal monster that constantly reconfigured itself as it advanced.



Combine Styles

Viktor Antonov

Once the basic design themes of the Combine invaders had been developed, the team applied them to many different kinds of objects in the world.



Train to City 17 Introduction

Marc Laidlaw

A working version of the opening Trainstation scene

TRAIN TO CITY 17

Brief: As in M1, the trainride must showcase all the promises we're making about our new game and technology. From a storytelling perspective, the trainride must unfold in such a way that it helps tell the story of events in Gordon's absence. Starting with familiar elements, the landscape will get stranger and more ravaged as we approach City 17. Train announcements, porters on the train, overheard conversations among other passengers will also serve to guide the player to the new world.

TRAIN SCRIPT

- You are in the the Wild Train, speeding across the ominous landscape of the Wild.

TRAIN PA [10:00]

Train announcements play continually, in ironic counterpoint to the vistas seen from the windows. They prepare the passengers (and by extension the player) for arrival in City 17, giving them some idea of the paperwork and processing they must submit to when they arrive.

- Nonliteral transition effects: Each time you pass through the darkness of a tunnel, the population of the car changes to give the impression that you are still in the G-man's influence, that the passage of time and distance is being blurred. Distinctive sound and visual artifacts will help to give these moments the G-Man's stamp, and they will be used in later parts of the game, at moments of transition or fugue, when we again wish to bridge the passage of time and show the G-Man's influence. The style of the G-Man "check-out" should be prototyped based on the experimental Hazard Course map.
- For the next several minutes, we pass through representative scenes of the Wild, each sector telling a bit of the story of the last 10 years. We move from remote wild lands successively more fortified and urban areas, until we are in the heart of City 17. The changes are gradual, covering a spectrum. Meanwhile, we play out a scene with your fellow passenger, including the incidents described below: we run announcements from the Wildland Train's PA system; we allow the player to move and look around freely, providing enough events that they can play this opening sequence several times and continue to notice and discover new details. The views are always of things the train is leaving behind, providing a novel and disorienting twist on previous train rides.
- The train car itself is a decrepit passenger car, ugly, weird and functional rather than comfortable. The windows are protected by shutters that raise and lower at the engineer's will; some are webbed with impact cracks. Feeling propaganda posters show the face of Dr. Breen as well as views of the CITADEL. The other passengers are huddled in their seats. The one at the rear of the car is known as SAMUEL G-1173333; he is the one character who will interact with you. The others will only grunt, shake their heads, and mutter, "Leave 'em alone" if you try to interact with them (using vocal).
- As the ride begins (in motion), the train speeds through a nightmarish landscape, with wide panoramic views of a mutilated countryside. Distant ruined objects are silhouettes on the horizon. There are twisted shapes

of what used to be trees, tangled forests of dead wood. An occasional crumpled chimney and marks of building foundations. Broken roads with overturned hulks of cars, trucks, buses, tractors. And in the midst of everything, glimpses of movement: Alien fauna. Grey shapes that might be massive Bullsquid, packs of houndeyes that hunger has turned into fierce, voracious predators; and new things, never seen before.

- Off to one side, you see another train hurtling through the dusk. It gives you some sense of the train you are riding. The nose of the engine car is protected by a huge deadly variant on a cow-catcher, a sharpened steel plow designed to shear through herds of whatever creatures might stray across the tracks or try to take the train head-on. Something that resembles the old Gargantua looms up from a fissure, lunging at the parallel train, and the engine slices right through the thing, leaving it in gory pieces on the track.
- The wild gradually gives way to a more suburban variety of ruins. Now we see broken buildings, choked barbed wire, and fewer monsters. On the horizon, in the distance, we see huge, skeletal shapes, enormous mortar-mechs, marching in silhouette against the hunched strip of reddish sky. Machines have replaced beasts as the biggest threat. We will encounter these creatures, and all these areas, later in the game, on foot.
- Something barrels itself against the train, smashing part of a window. Noxious gas trickles into the car. The thing, whatever it is, clings to the roof of the car. You can hear it scrabbling about up there, but all you see is one grasping, suckerlined appendage or tentacle which continues to flail at the broken window. The passengers take little notice of it. The passenger sitting at the broken window merely gets up and moves to the other side of the car. When the train is struck, the car shudders and several suitcase slides from the overhead racks and crash down on the floor. They are all empty.
- The train frame, closer to City 17, begin to run through a protective barrier of electrified wire fences. Caught in the wires are the skeletal and charred remains of monsters that have killed themselves trying to get at the most reliable source of food in the wild. Beyond the wires, other creatures watch hungrily as you pass. Occasionally something huge makes a rush at the fence and dies there in an explosion of sparks.
- Closer to the city, the train passes through mountains of debris. It's as if bulldozers have pushed all the remains of the old world out here, forming a huge barrier that surrounds City 17. We look down into ravines full of poisonous liquid, monsters foraging and borrowing in the scraps. The broken carcasses of one of the mortar-mechs lies near the train, if you happen to know what you're looking at.
- The train slows for no obvious reason. At the rear, you become aware of a pack of wild monsters that have somehow gotten inside the track barrier. They are galloping up on the train from behind. As they come closer, the train pulls slowly through a huge set of gates. The monsters are gaining on the train—just about to leap through the gates when a pair of autocannons mounted on either gate open fire on the pack, tearing the beasts to shreds as the gates slam shut.
- The train moves at reduced speed through a security area. CREATORs are at work in the train yard, hoisting the yard with fire-catching headcrabs

and perhaps a bullsquid that have managed to get into the perimeter, and incinerating them.

- The next area is a former switching yard. You can see other trains coming into City 17 through other gates. Metropolis police patrol the yard. Stalkers move about busily—in the dim light it's hard to see them clearly. One of the stalkers is crushed beneath the rails of a train, but no one seems to notice.
- Beyond the switching yard, the train passes out into the Old City on an elevated track. The ground drops away, and we thread slowly between old brick buildings, logged-off freeway ramps, deserted streets. Fires burn down in the crumbling buildings; there might be people in there but it's hard to be sure. In a street below, a man runs out of an alley and rushes down the street, parallel with the train. Behind him, a squad of Metropolis police step from the alley and open fire. The man falls. The scene passes from view as the train moves on, into a tunnel.
- When the train emerges, it is winding through a section of the New City. Grey, fortress-like buildings, cold and inhospitable. The train slides slowly past an apartment building that looks like a prison gun-tower. We get a glimpse into one of the apartments: It is uninviting, sparsely furnished. A TV glares from the wall, and on the screen you have your first glimpse of the living Dr. Breen, making one of his interminable broadcast speeches. There is a family gathered around the TV. All of them are wearing their rubber suits and masks. Beyond the building, in an open square, a giant monitor looks down on the avenue below. The same Dr. Breen broadcast is projected here. You see pedestrians and buses moving below. Things are too orderly, regimented.
- Above the buildings, for the first time, you get a view of the Citadel, an ominous alien spire that looms at the center of City 17. It's a brief glimpse, for now.
- The train now screeches into Station 17, braking. The station is elevated above street level; beyond the security checkpoints, stairs and ramps and escalators run down to the street, or arch off to some of the buildings. You pass into a tunnel, into the station proper, and the train comes to a halt at the security gate.

TRAIN PA

Now arriving, City 17.







Trainstation

Viktor Antonov

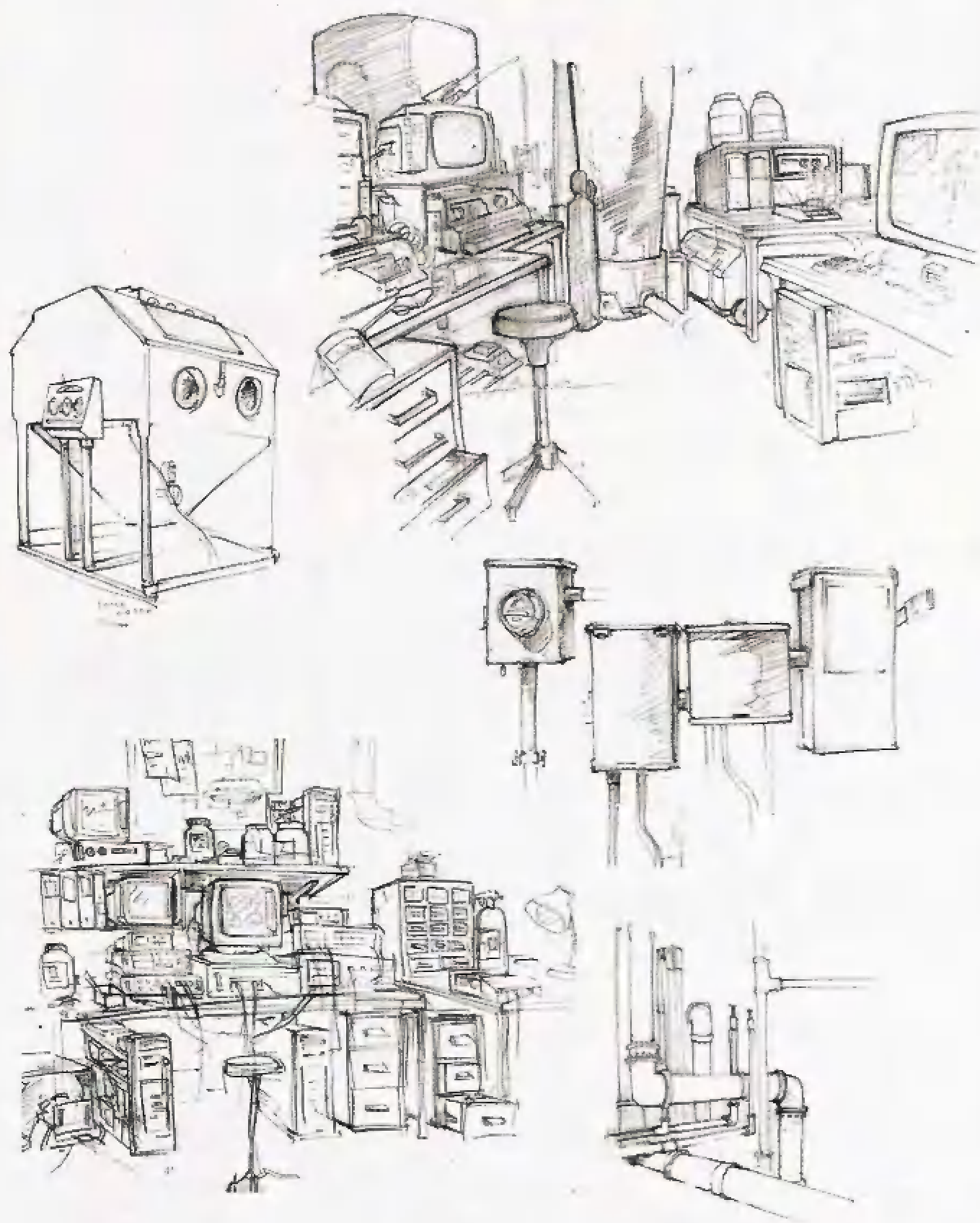
The player's path through the City 17 Trainstation was meant to play a role similar to that of the train ride in *Half-Life*. In *Half-Life 2*, the story would unfold at the player's own speed, rather than on a fixed rail, and come about through interaction with the characters naturally found in that setting.

"Getting the Trainstation right was critical, since it was to be the place where the player formed his first impression of the world—the ways in which it had changed, and the ways in which it was still the same human world." - Aaron Barber

"The first version of the Trainstation was very close to a train station designed by Alexandre-Gustave Eiffel, of Eiffel Tower fame, in Hungary's capital, Budapest. The final iteration was more closely based on a train station near where I lived in Paris." - Viktor Antonov







Doctor Kleiner's Lab
Eric Kirchmer & Dhabih Eng

An early concept for Dr. Kleiner's teleport (below). Doctor Kleiner's laboratory is chock full of interactive objects to amuse the restless player.

"We added security monitors to view, a mini-teleport to play with, big corkboards with lots of little details to look at, and pretty much anything we could throw in there to help those players bide their time." - Dhabih Eng







City 17

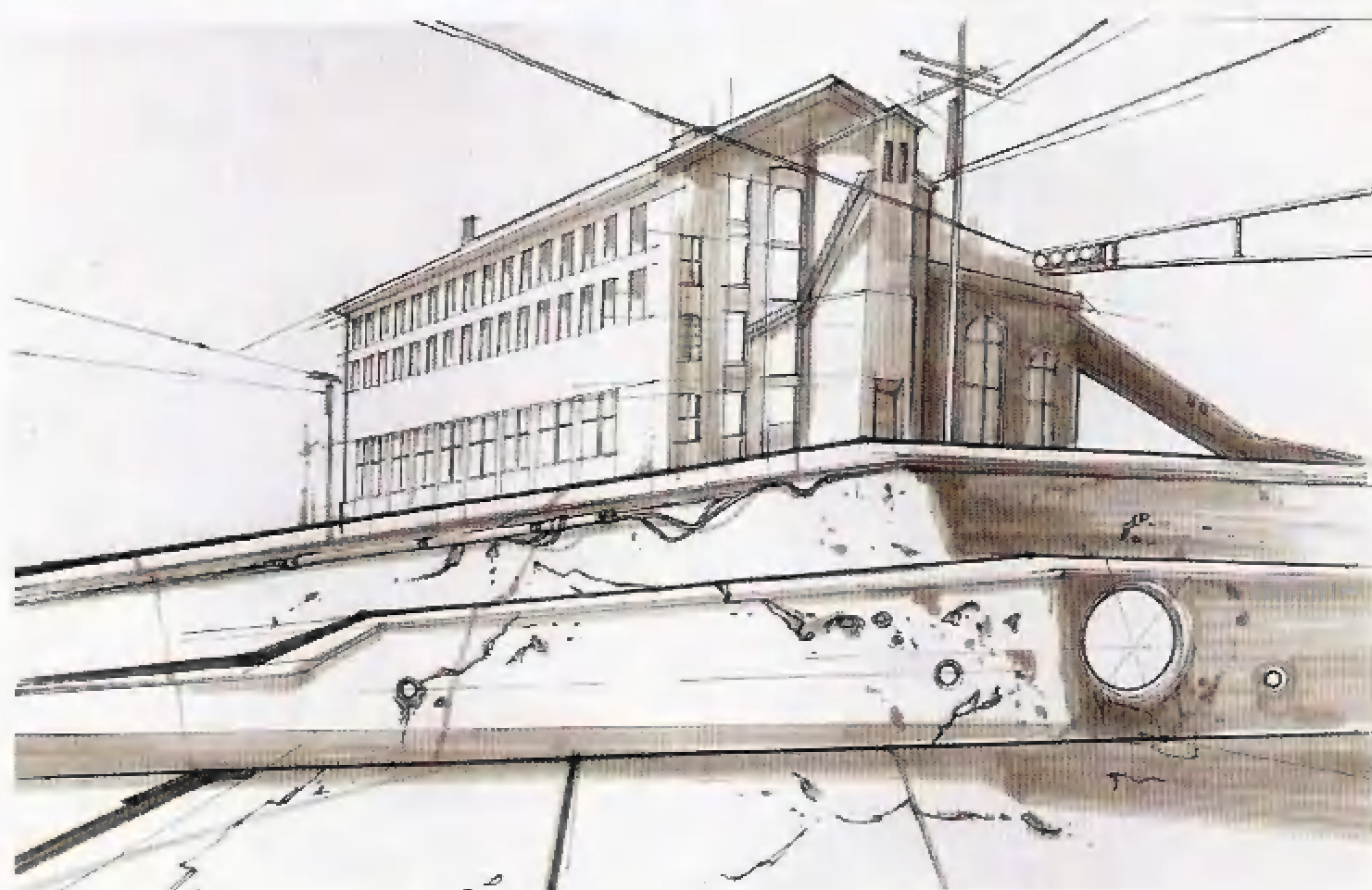


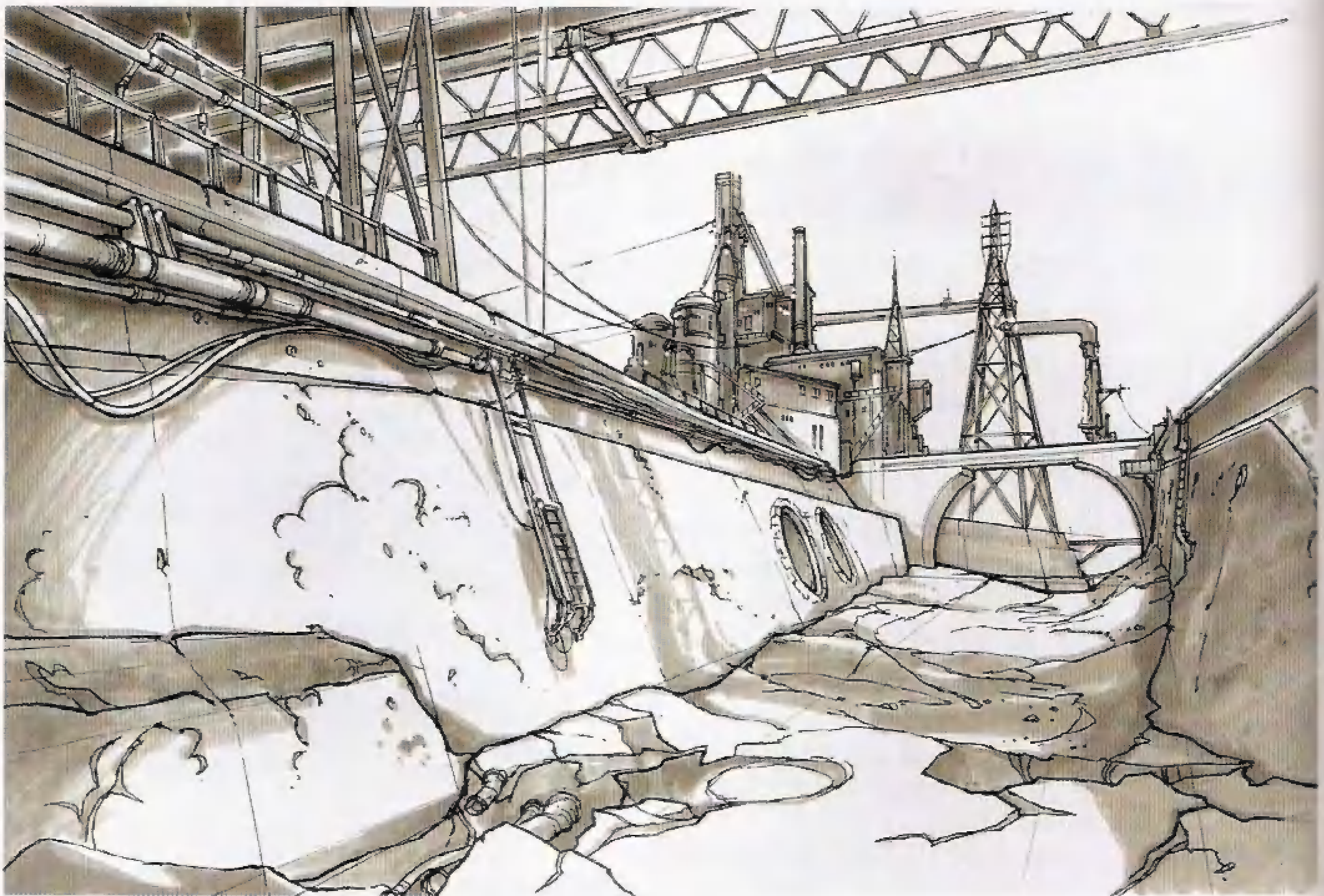
City 17 Propaganda
Randy Lundeen





Canals
Dhabih Eng & Tri Nguyen





Canals
Tri Nguyen



Canals

Viktor Antonov

"The original design of Canals was set up with a lot of enemies that the player would drive under, but we found that people didn't consistently play through that way. They didn't want to leave a couple of guys behind that were pestering them or getting a clue that they were missing something in the game. For a lot of players, they want to experience 100 percent of the game, and they felt like they weren't getting that. So, Canals went through a lot of changes to make it more direct in terms of combat or more direct navigation." - Dario Casali





Eli's Lab

Dhabih Eng

An early concept of Eli's lair (below), and the eventual lab setting (right). Eli's base of operations went through numerous changes over the development cycle. At one point it was situated beneath an overturned ship, at another it was drilled deep into rock, with hanging gardens and underground wells. What never changed was the notion that it should feel like a place of safety, a warm and friendly oasis in the midst of a harsh environment.



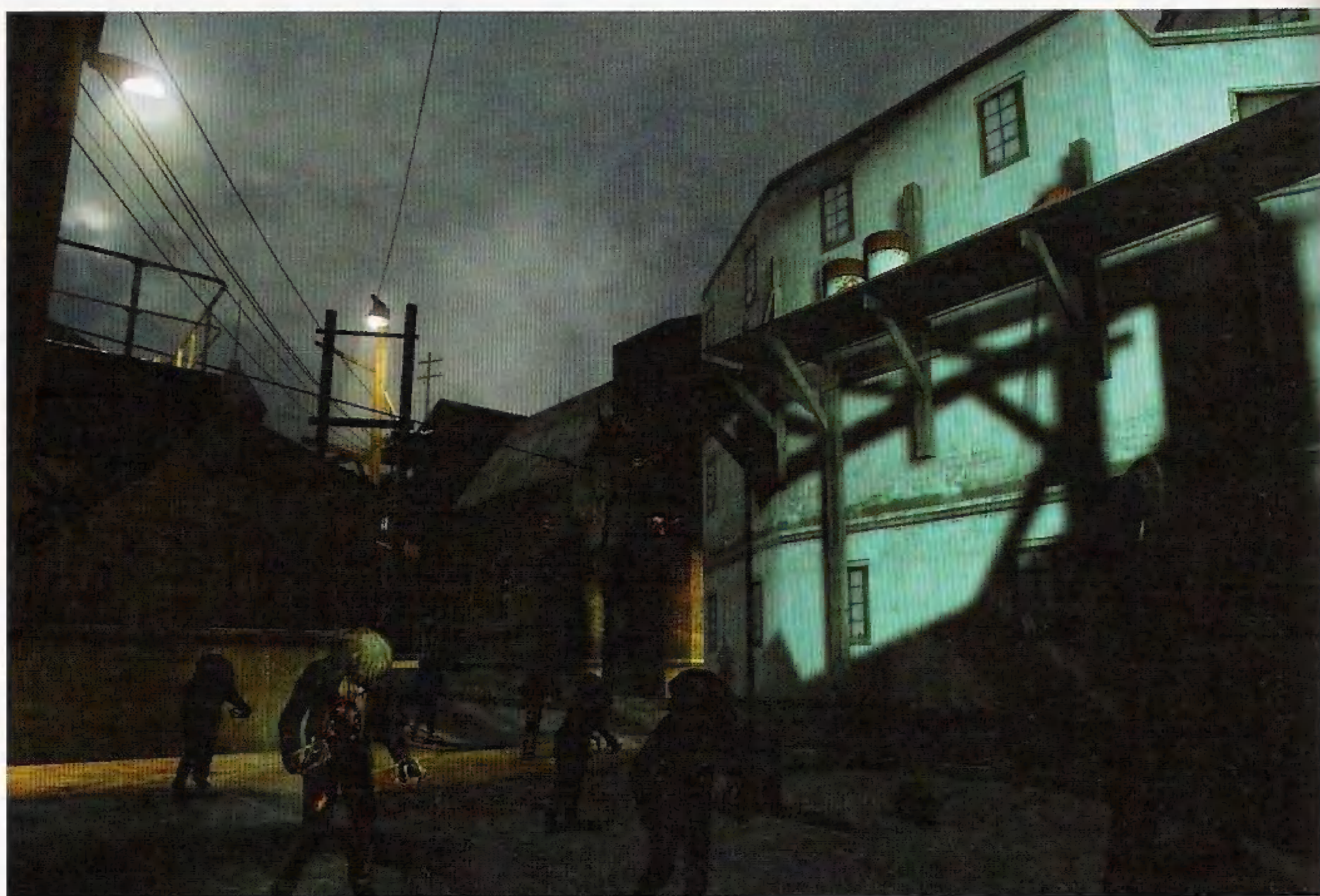
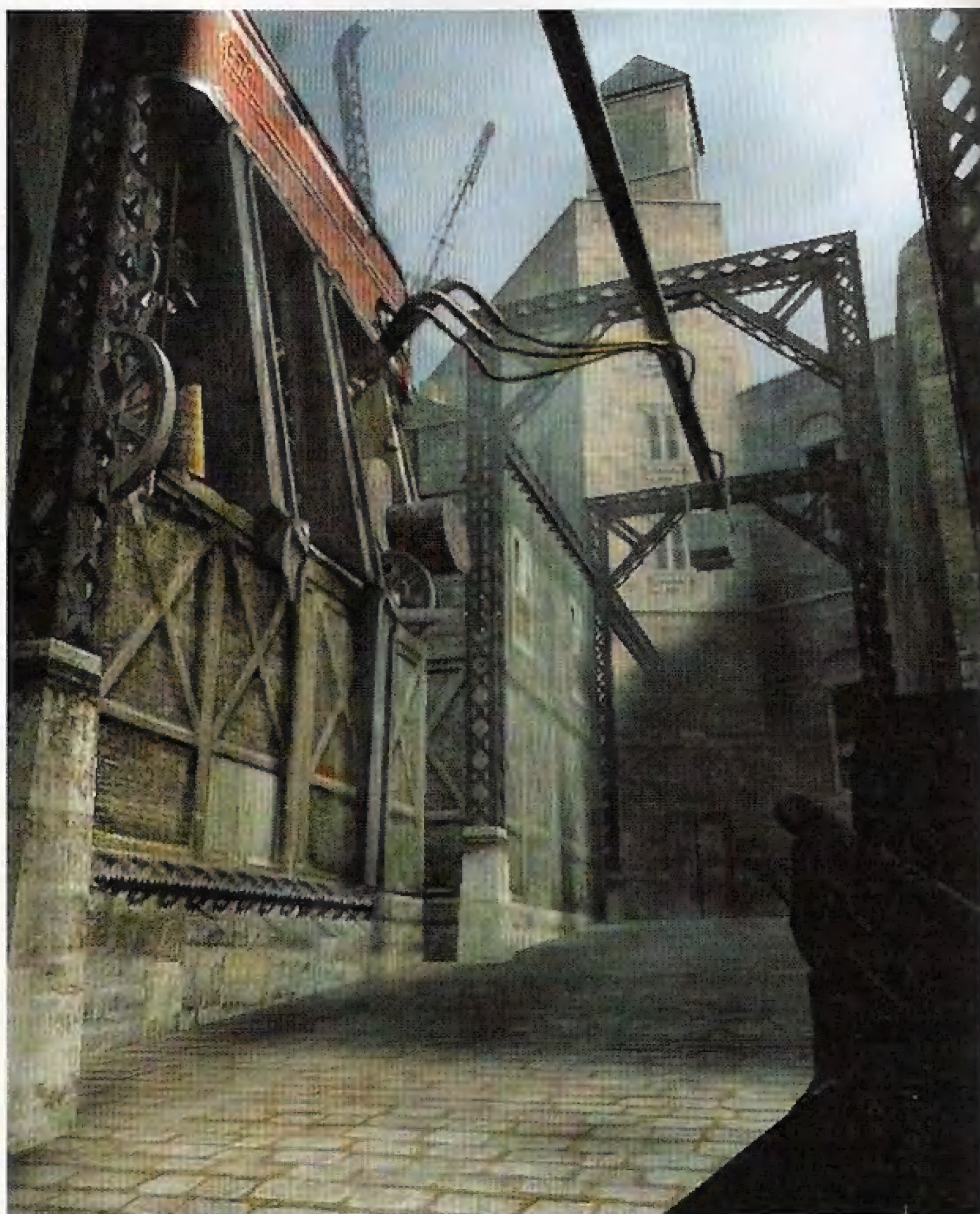


Ravenholm

Viktor Antonov

"Ravenholm was to be a sanctuary gone bad, a place where the player went expecting help from allies, but discovered instead that they had all become enemies. The challenge was to build an isolated town, remote enough to have escaped Combine notice for a while, but which still seemed to inhabit the same world as City 17."

- Dario Casali

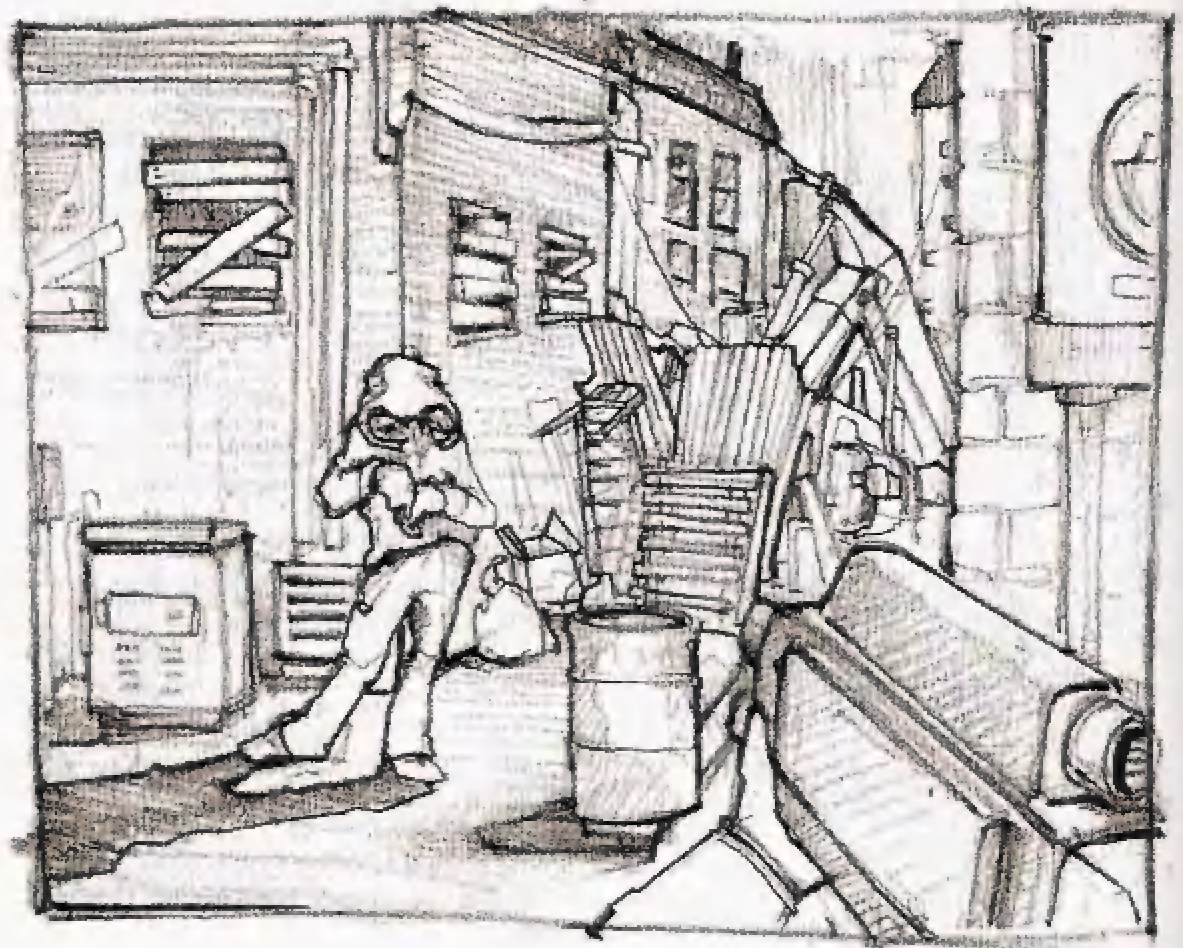
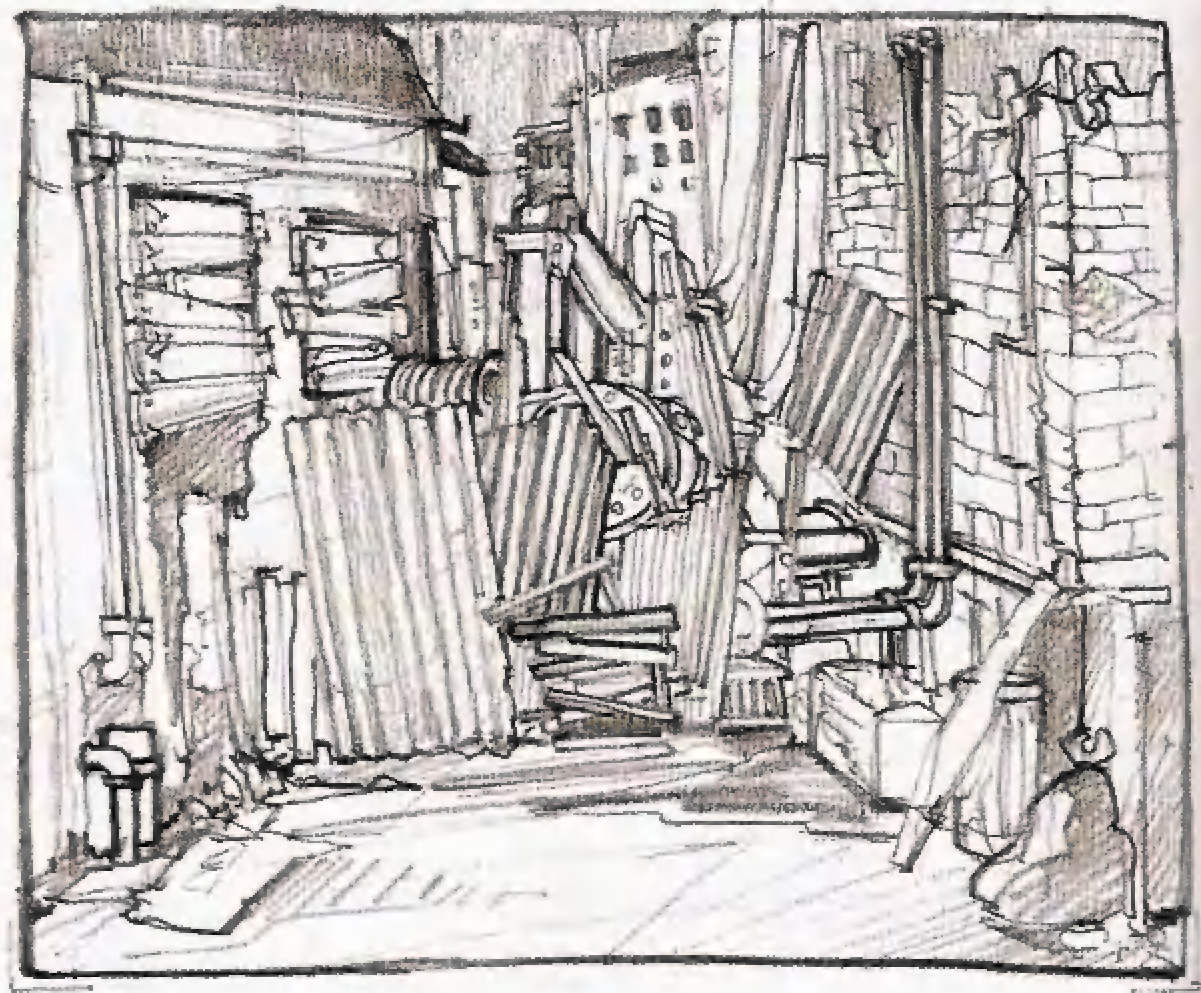


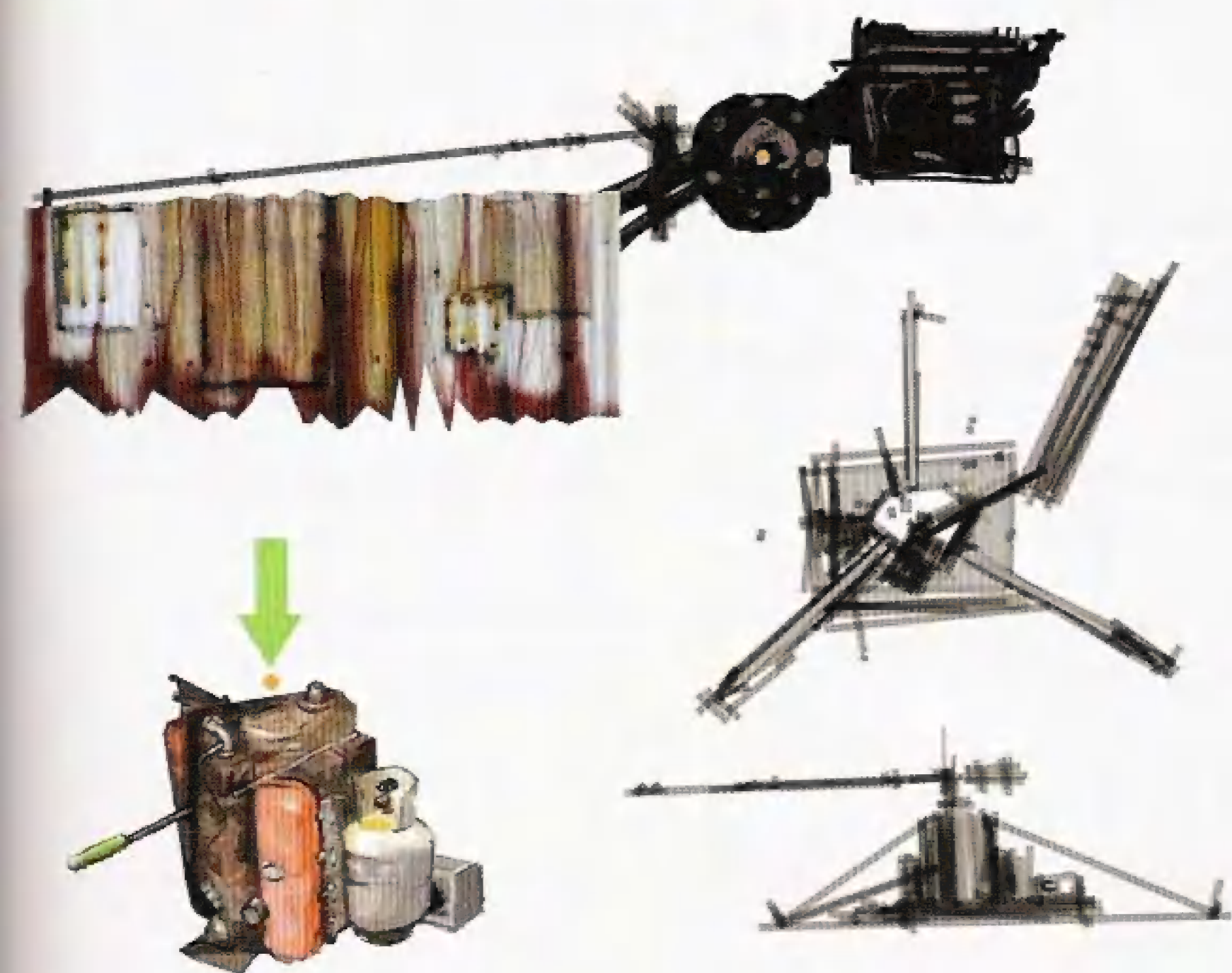


Ravenholm

Eric Kirchmer & Horia Dociu

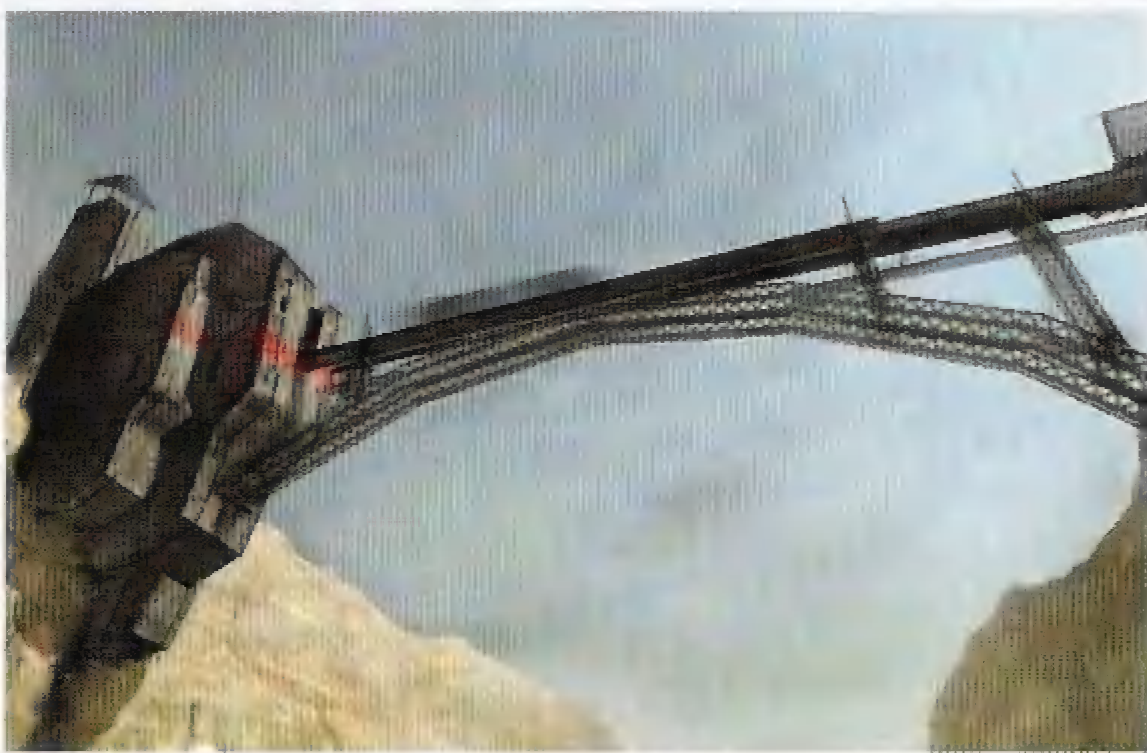
Artists often worked in league with level designers to create the precise look and geometry of levels and gameplay elements. While a level designer could test early ideas for traps by using simple geometric shapes, at some point they would turn to artists to convert the rough designs into detailed models.









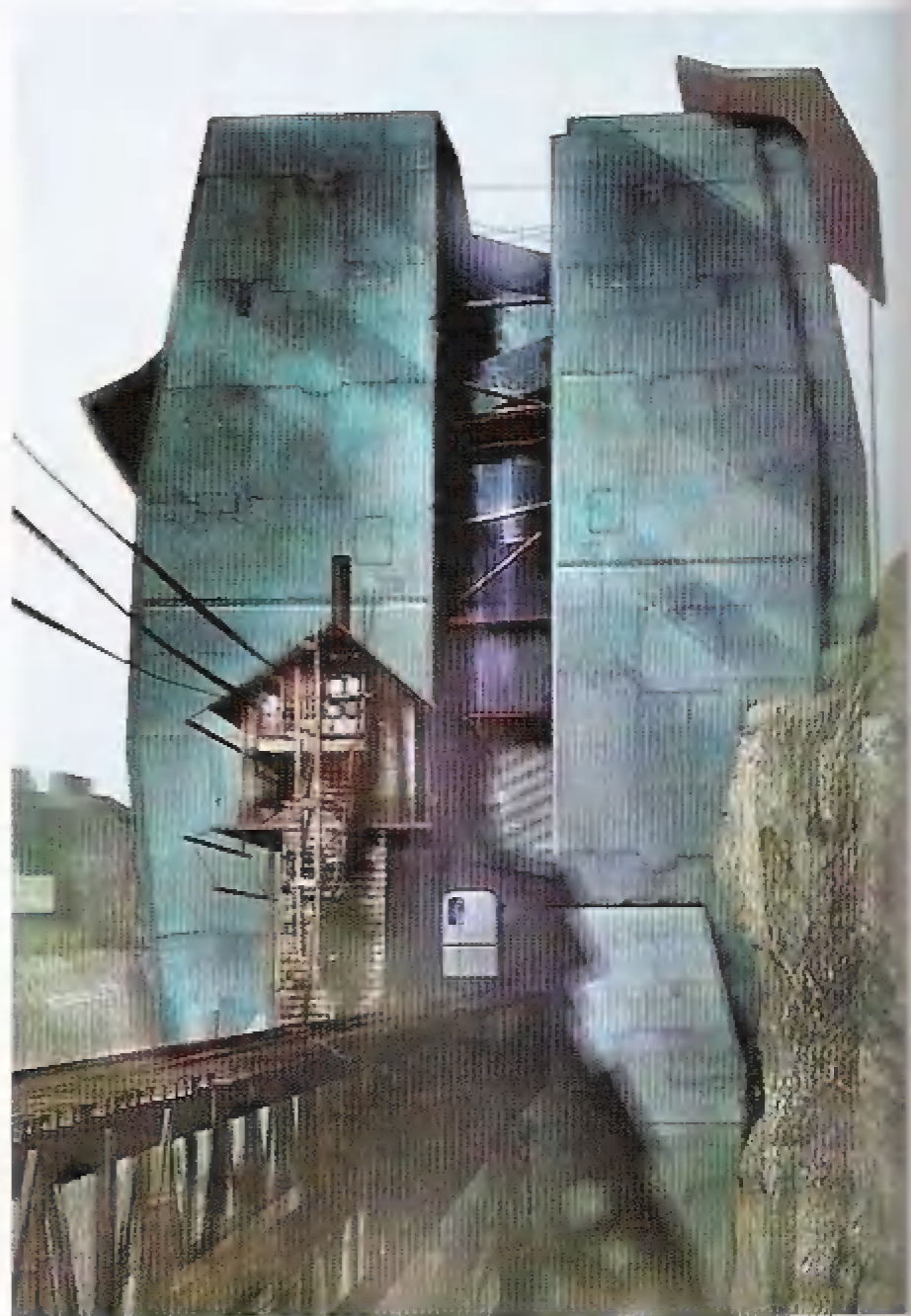


Coast

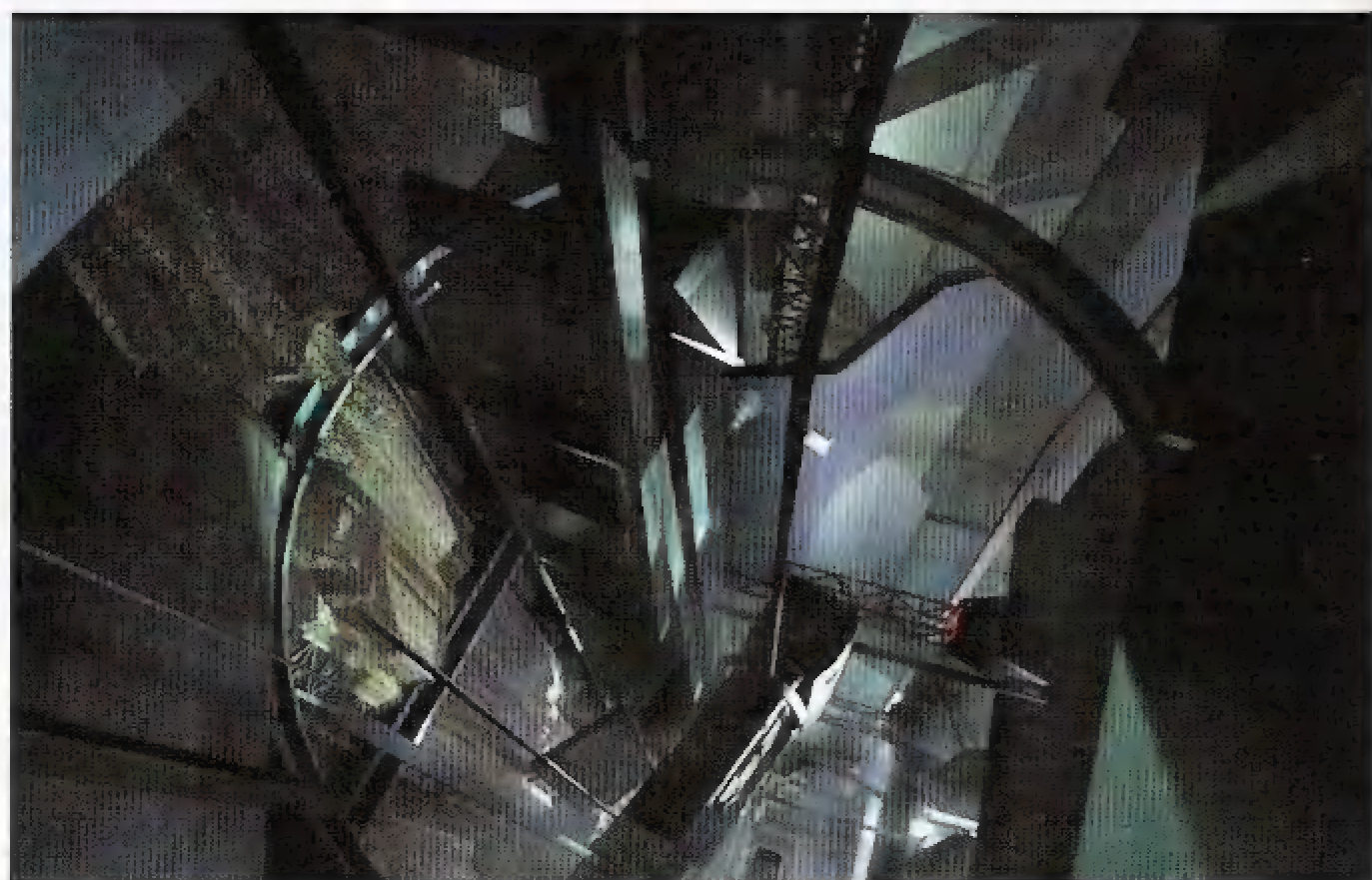
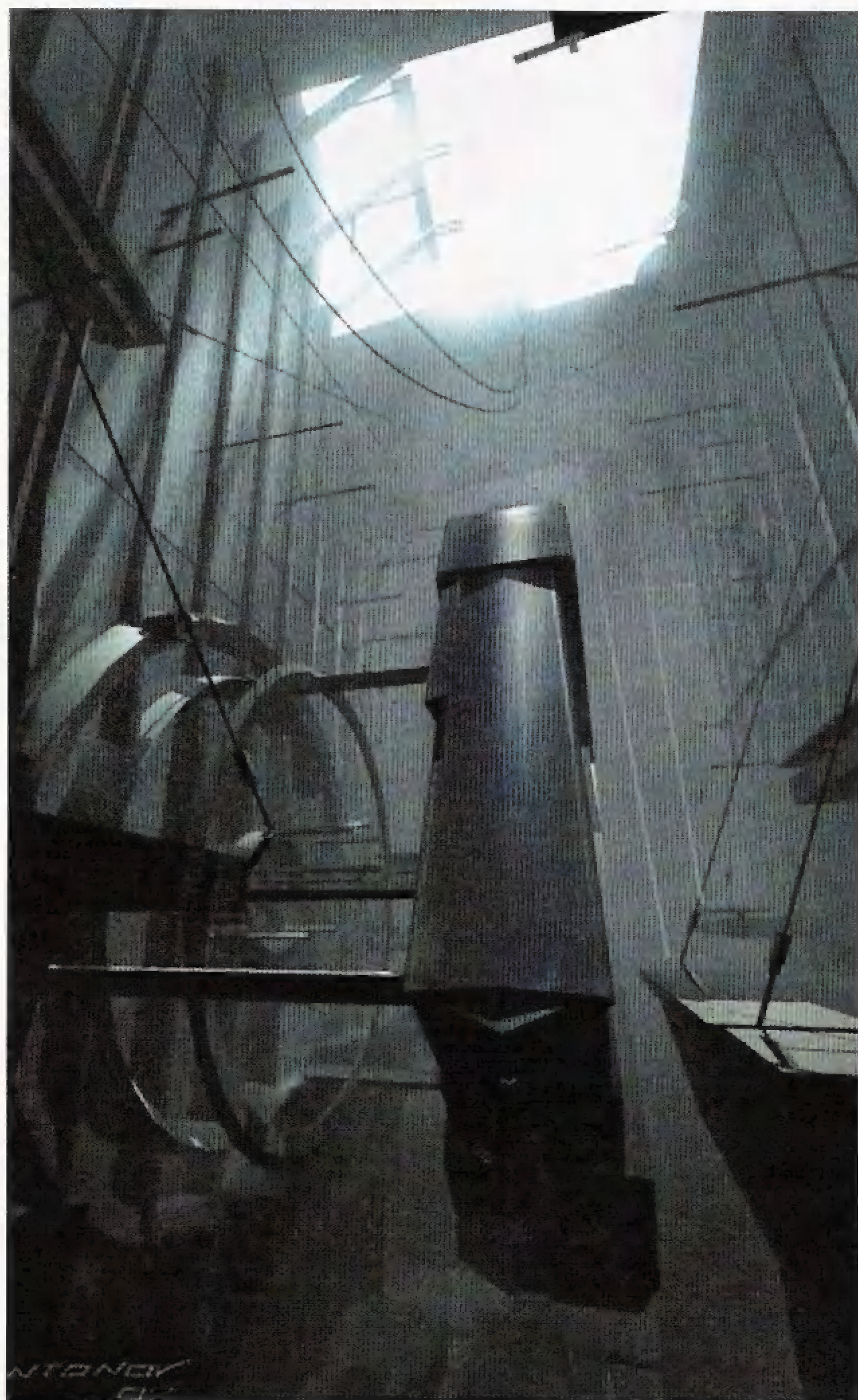
Viktor Antonov

Gordon Freeman's journey through the wasteland, from the earliest stages of the design, had him travelling parallel to the City 17 train. The train was a key theme of the game, tying all its environments together, transporting mysterious cargo from the City to outlying facilities.

Along the tracks were depots, where the train would stop, refuel, unload, or take on cargo. One main depot, originally a way station on the way to the Air Exchange, became an end in itself. Then when the Air Exchange gave way to Nova Prospekt, the depot was merged with that design, further streamlining the path through the game.









Coast

Viktor Antonov

"One of the consistent level design challenges throughout the project was addressing conflicting gameplay and artistic concerns. Gameplay passes would commonly introduce elements that didn't fit well within the current artistic vision, which would then require an art pass. Art passes often inadvertently changed something that had mattered to the gameplay. Most levels were bounced back and forth a number of times, with compromises in each direction. Some of the best levels were ones where art-pass changes fed successfully back into the gameplay by providing new inspiration. The bridge map along the Coast is my favorite example, as I feel it's one of the levels where the art and gameplay are most closely intertwined." - David Sawyer





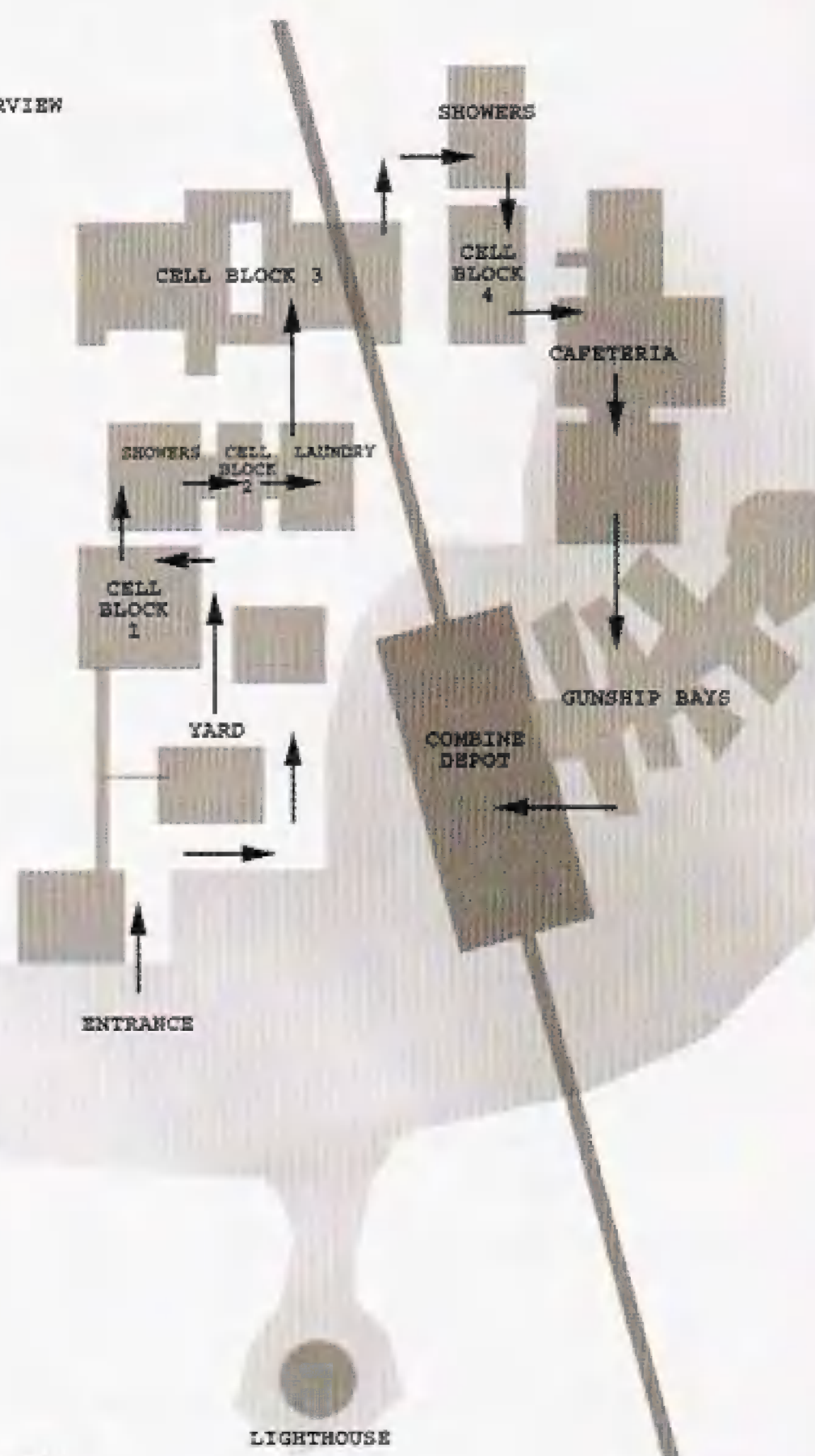
Nova Prospekt Express

Viktor Antonov

The Combine train (known internally as the Razor Train) was one of the first pieces of Combine machinery to be designed.



HL2 DEPOT
PRELIMINARY OVERVIEW



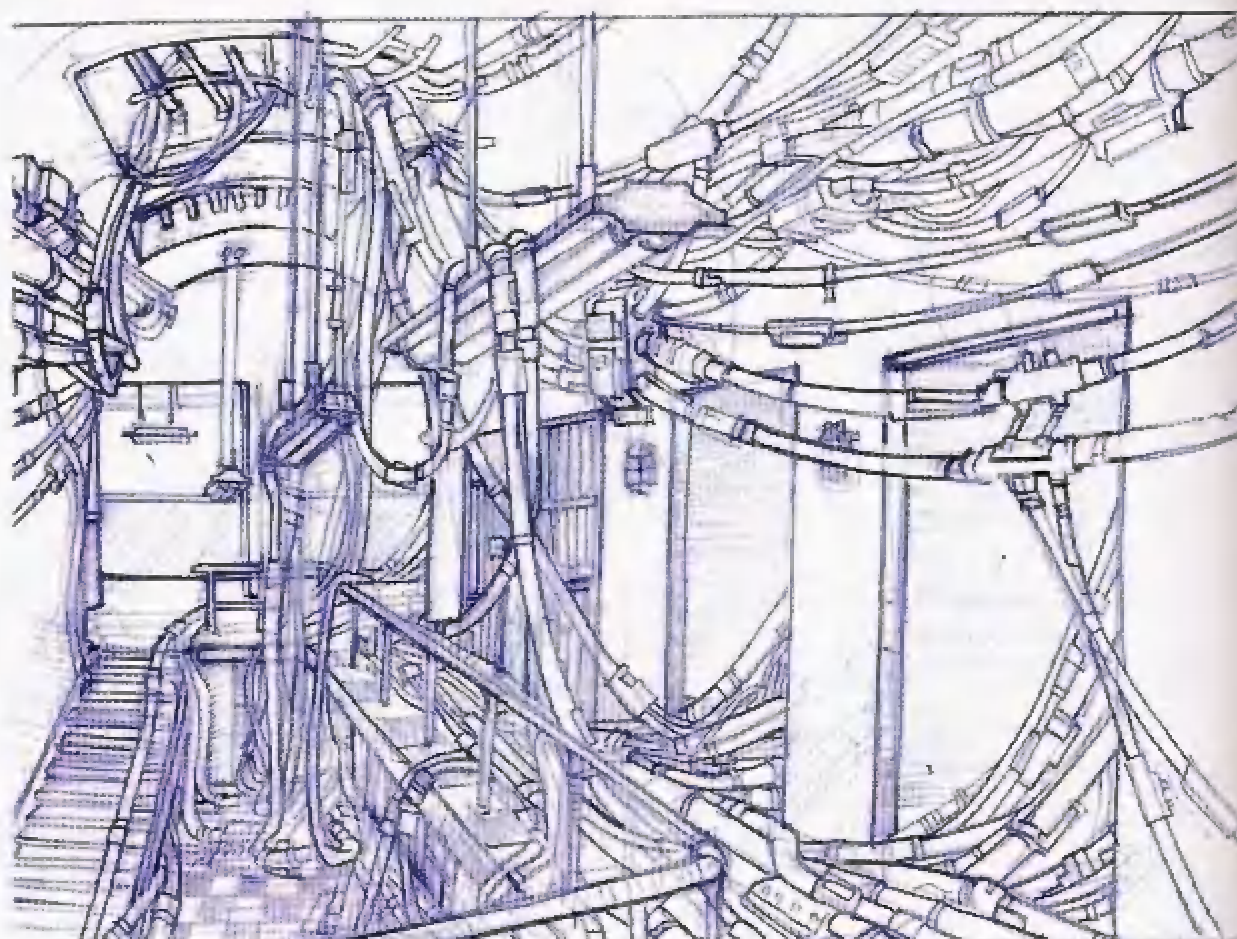
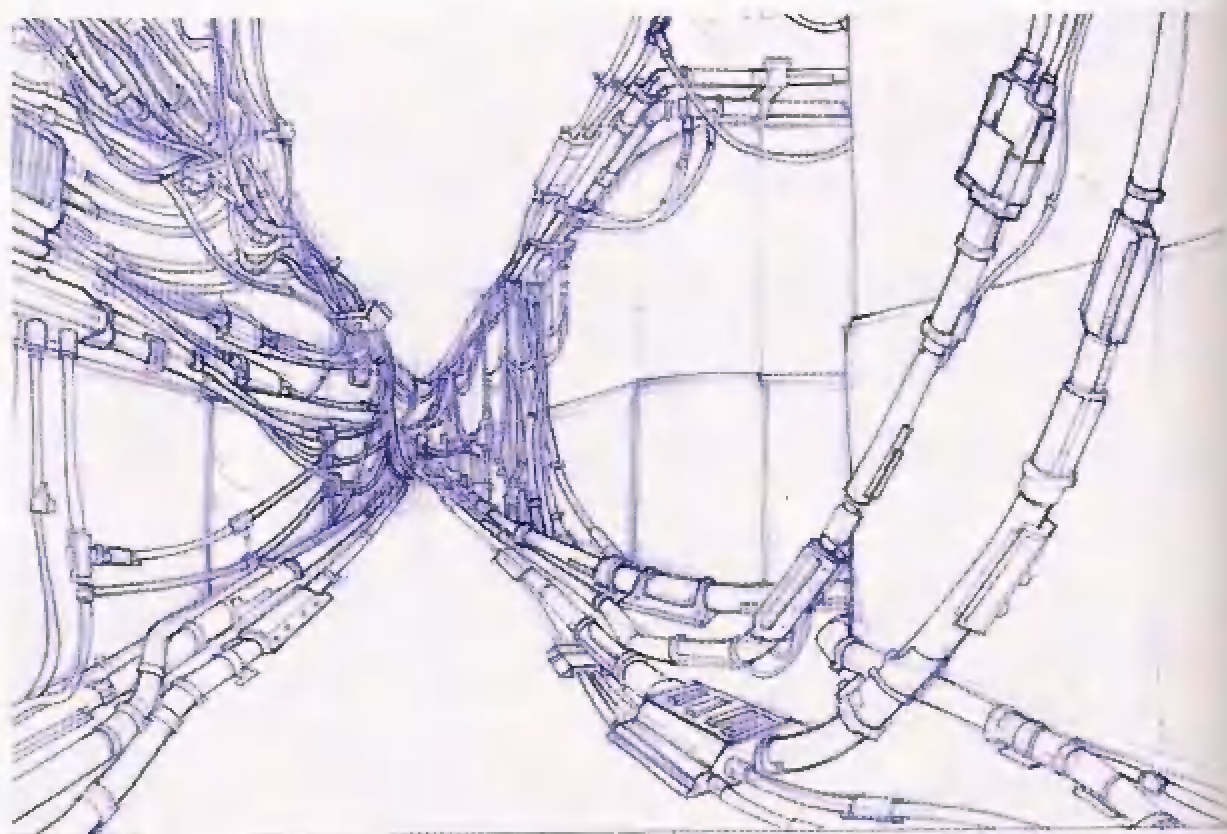
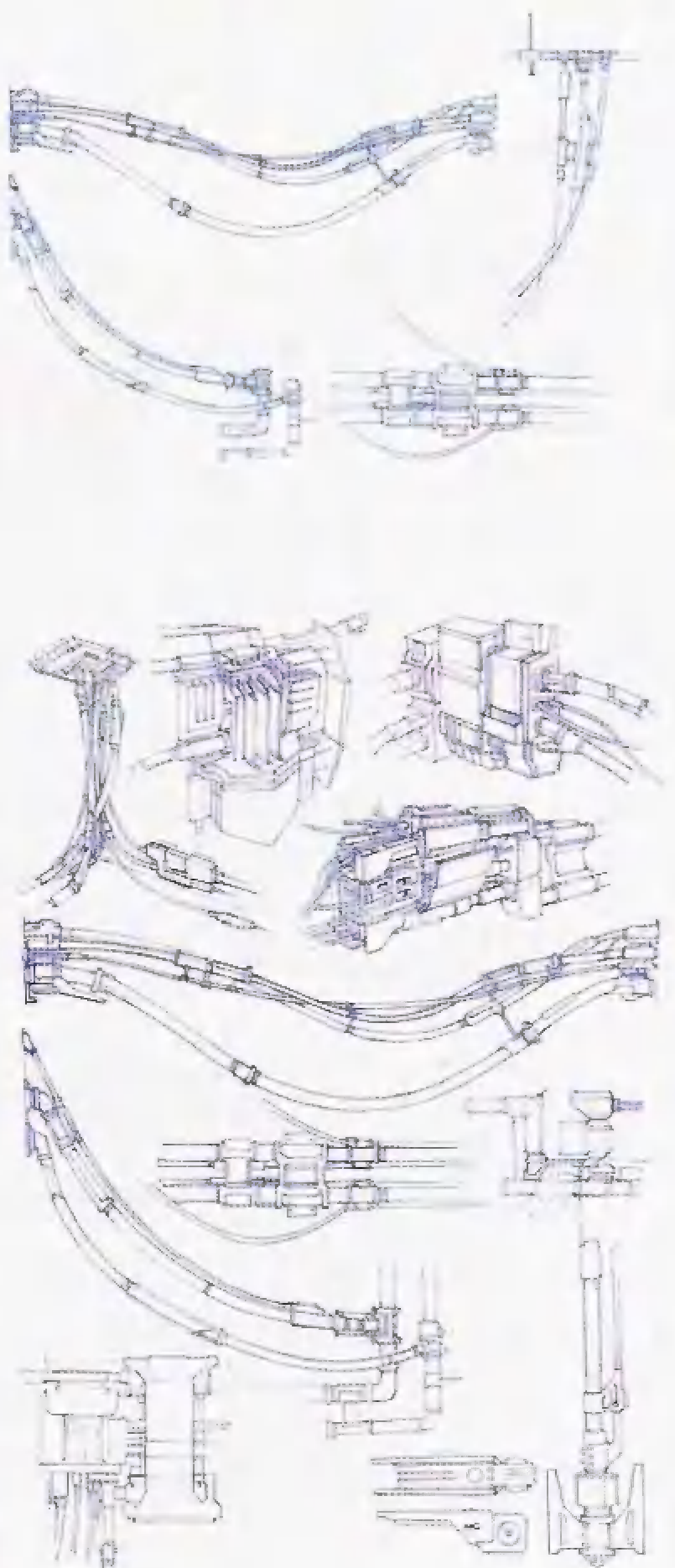
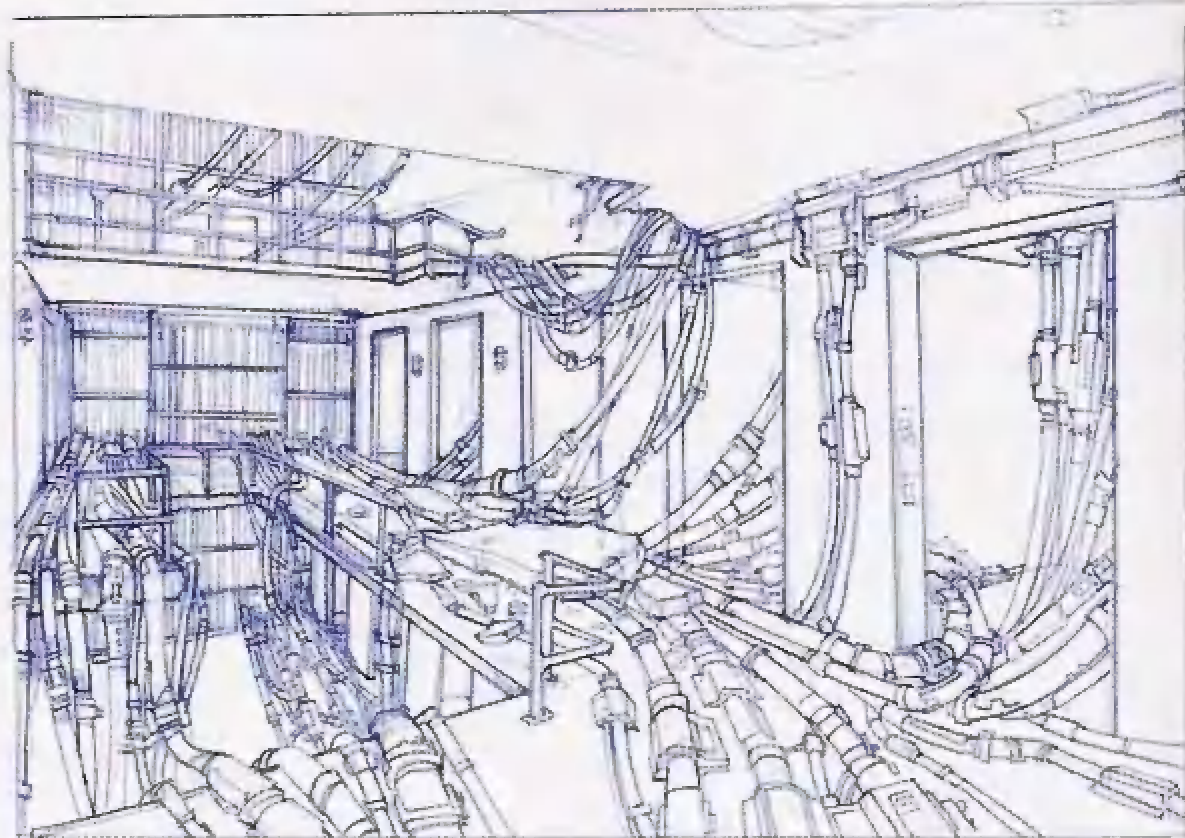




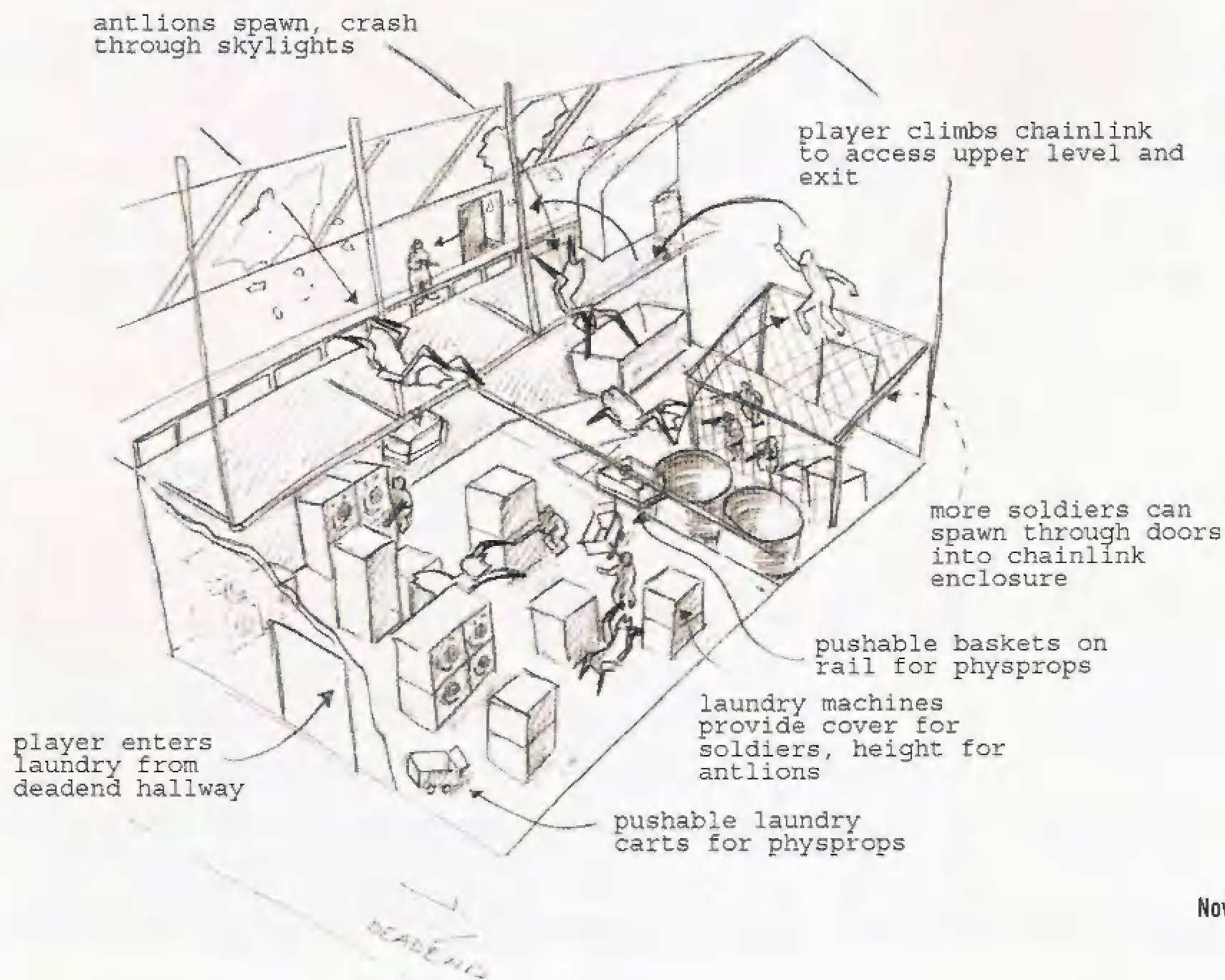
Nova Prospekt

Eric Kirchmer & Viktor Antonov

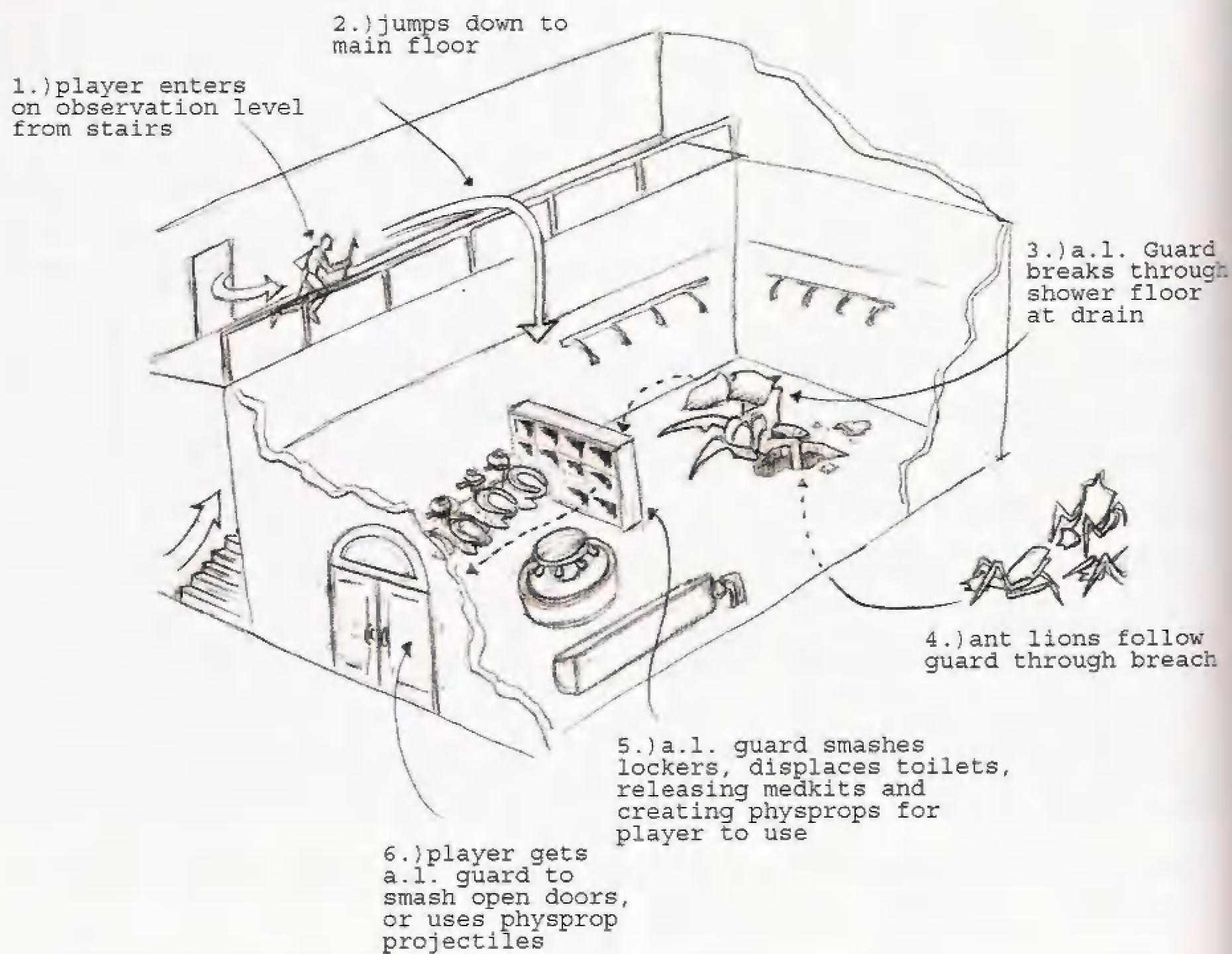
As the Air Exchange gave way to Nova Prospekt, the emphasis shifted from a purely industrial setting, to one where humans were treated like machine parts. The progression through the levels is one that was deliberately repeated over and over throughout *Half-Life 2*. Beginning in a familiar human environment, the designers gradually layered in more and more alien touches, until the environment was composed almost completely of Combine materials.

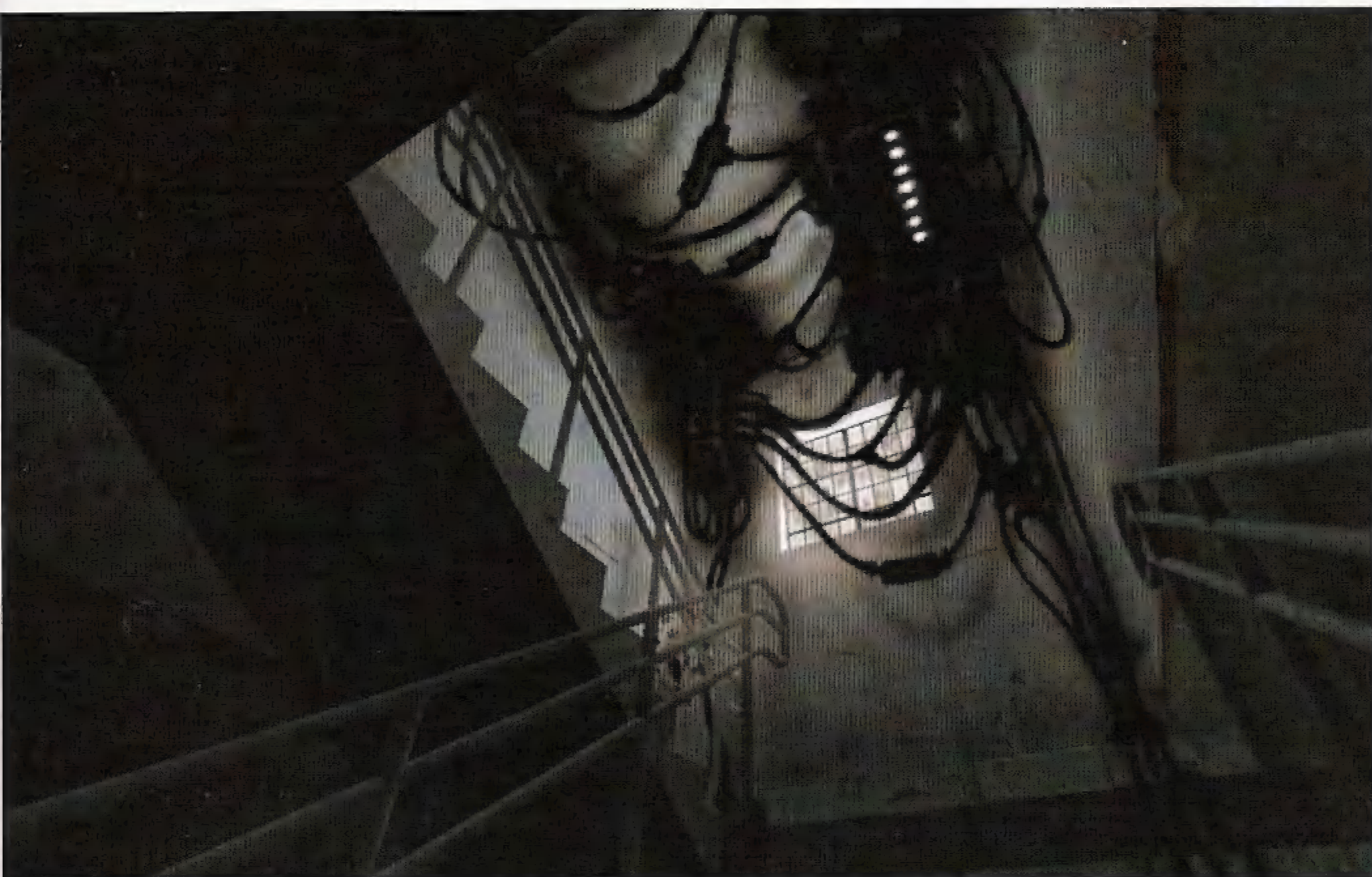
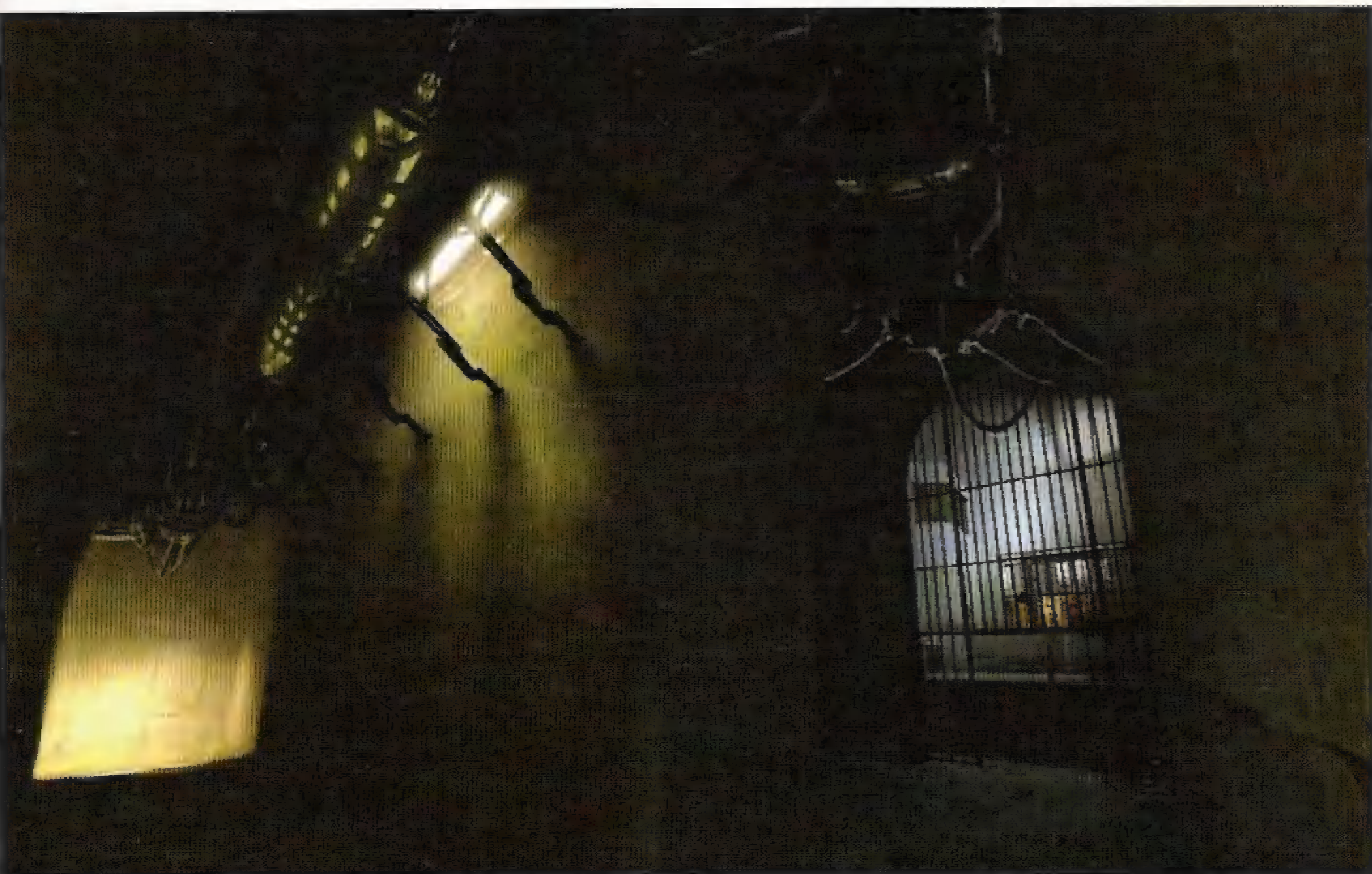




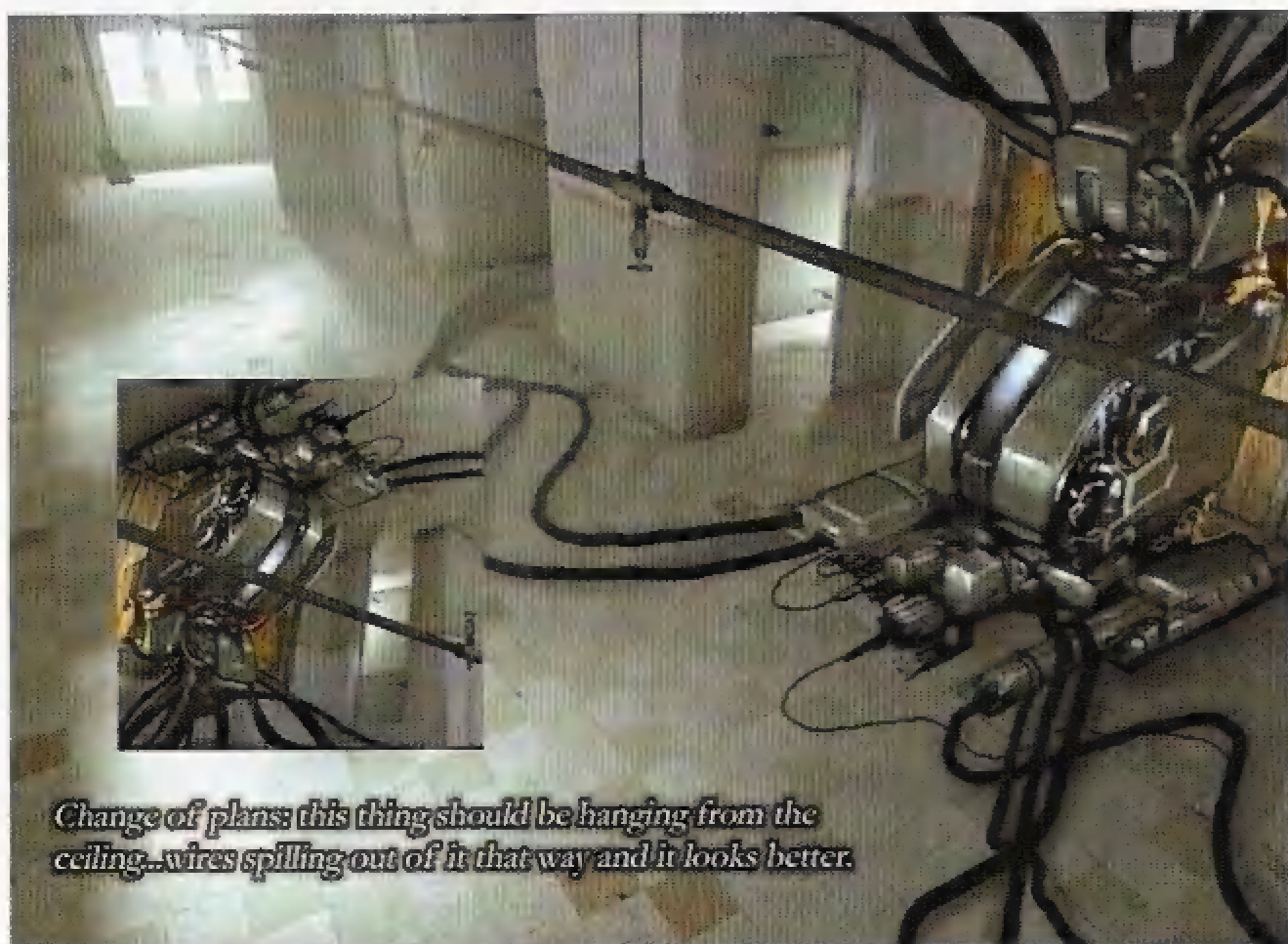
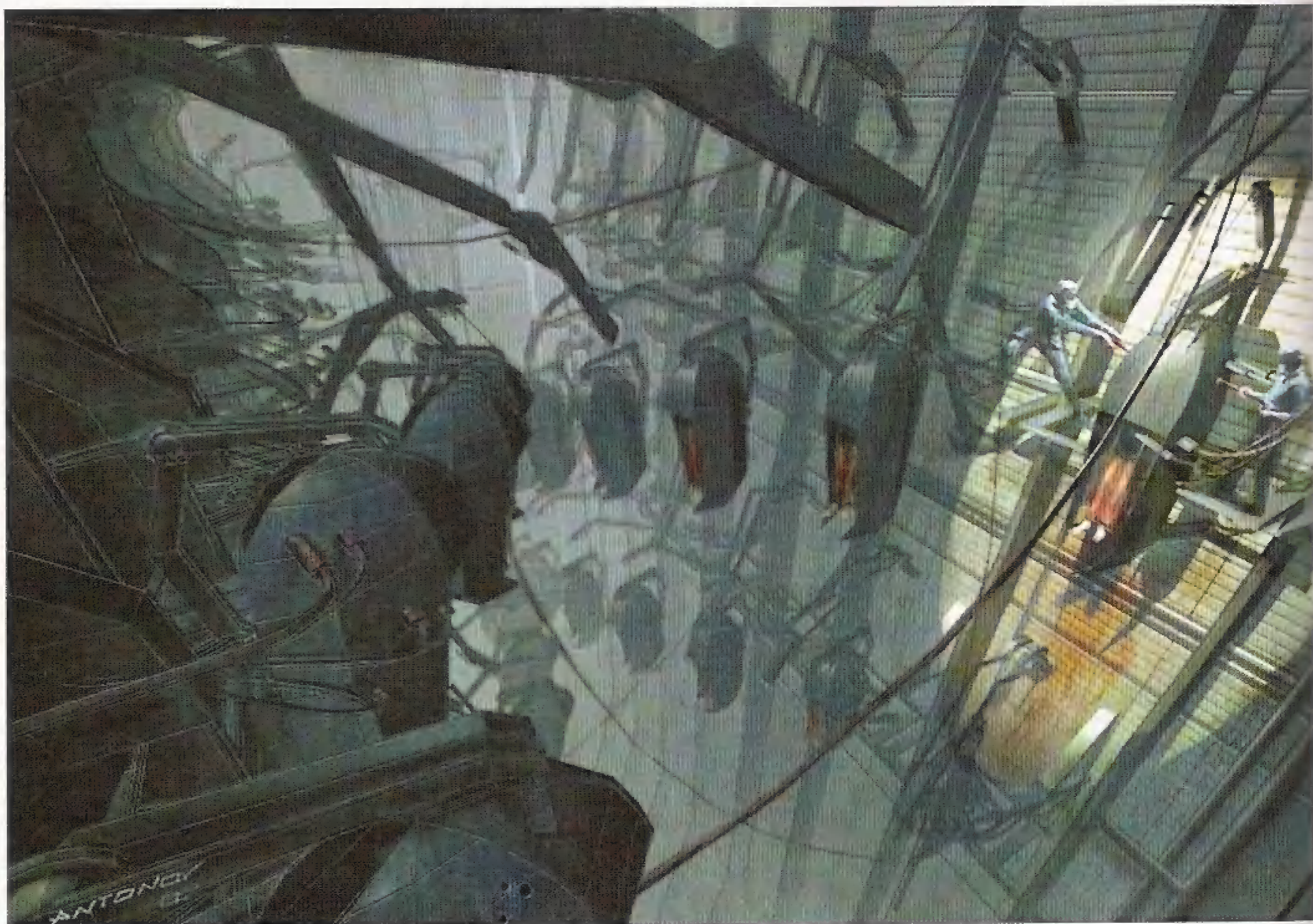


Nova Prospekt Schematics





Nova Prospekt
Dhabih Eng & Eric Kirchmer



Nova Prospekt
Viktor Antonov & Dhabih Eng

Artists often took screenshots, or images directly from the game, and added details over top of them in Photoshop. In this way, it was possible to try out in advance the effect of layering in Combine devices, and then modeling those devices so that level designers could place them directly into the game.

HL2 Depot

CELLBLOCK 3
(MELER AND BARRICADES)

Cellblock profile

Most battle is happening on ground floor - the top floor provides a breathing space from which to watch and intervene in player's favour, though stray antlions sometime come up the stairs or through windows.

Lower floor is swarming with antlions, but player can pick them off from the safety of the mezzanine/catwalk, thus easing escape through collapsed floor and to level exit.

Med supplies

Corridor split with cart system using barred mezzanine track (see reference)

Dead Antlion Guard

Player can drop bugbait or grenades onto soldiers below, softening the area before entering via damaged area of floor-bars.

Antlions also enter through windows

rusty cell doors not always enough...

PLAYER EXIT (TO STAIRS)

Scripted sequence - soldiers erect barricade, only to have antlions burst through ground behind them.

PLAYER ENTRANCE (LAUNDRY)

guard catwalk

Barricades

Filmy barricade, can be broken through by bugbait or weapons. Guards inside are being pushed up against it by antlions attacking from rear.

If player did not kill or bugbait guards (a) at start of level, they will have to be fought to pass.

empty cells with working doors can be used as antlion containers via bugbait, alternative to combat.

Isolated guards holed up in cells

Player has to drop into cluster of soldiers but can use height advantage (and/or bugbait) beforehand.

Soldier ragdoll

Earlier Barricade destroyed and overrun by antlions. (player has to find place to climb/squeeze through)

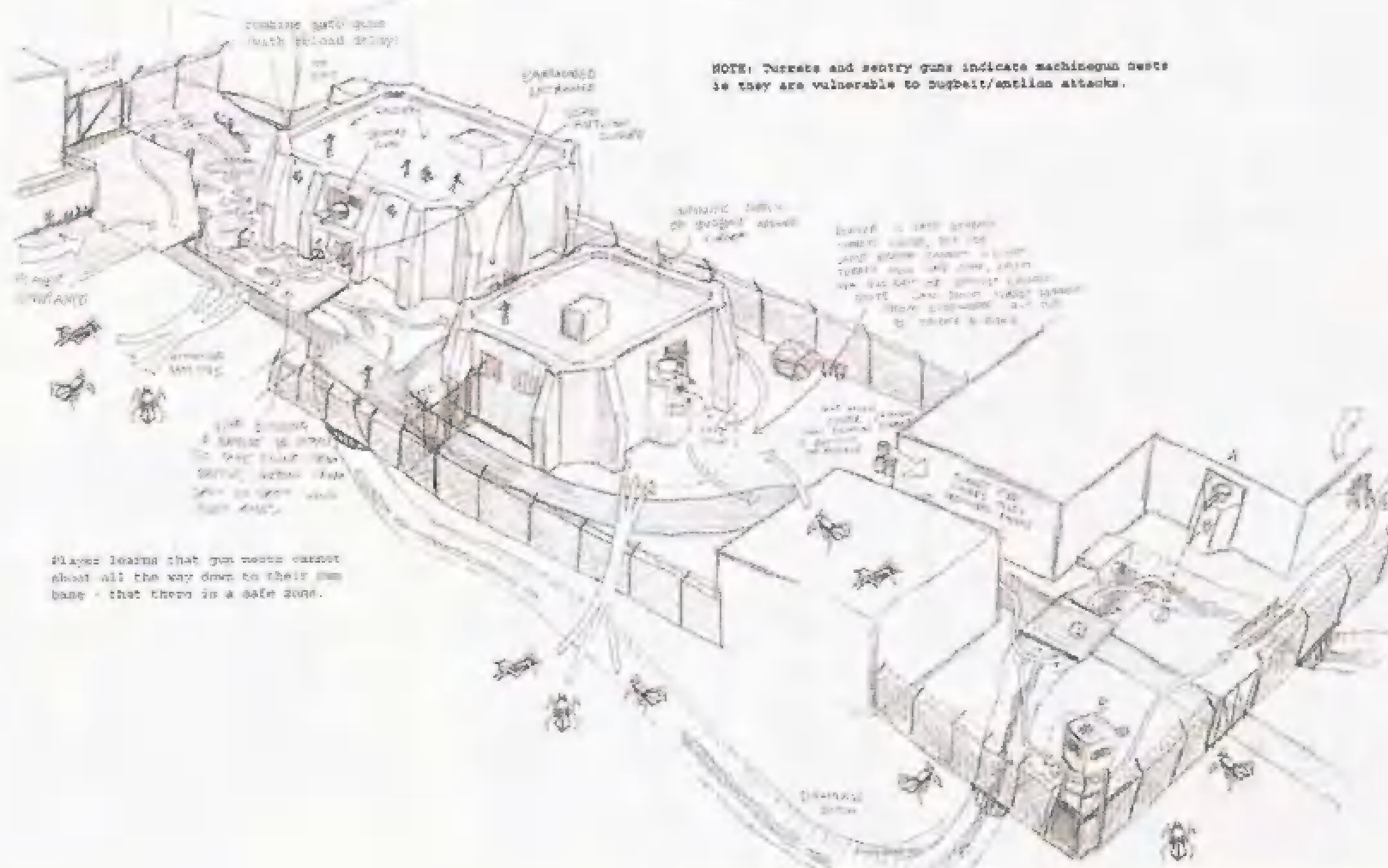
Guards (a) have backs to player, player is free to ignore them or ambush them

As player comes around corner, antlions break through barricade at end of hall, and overwhelm guards at (b). Player can hug bait guards (a), or a wall, or fight forward.

Med supplies, wounded soldier.

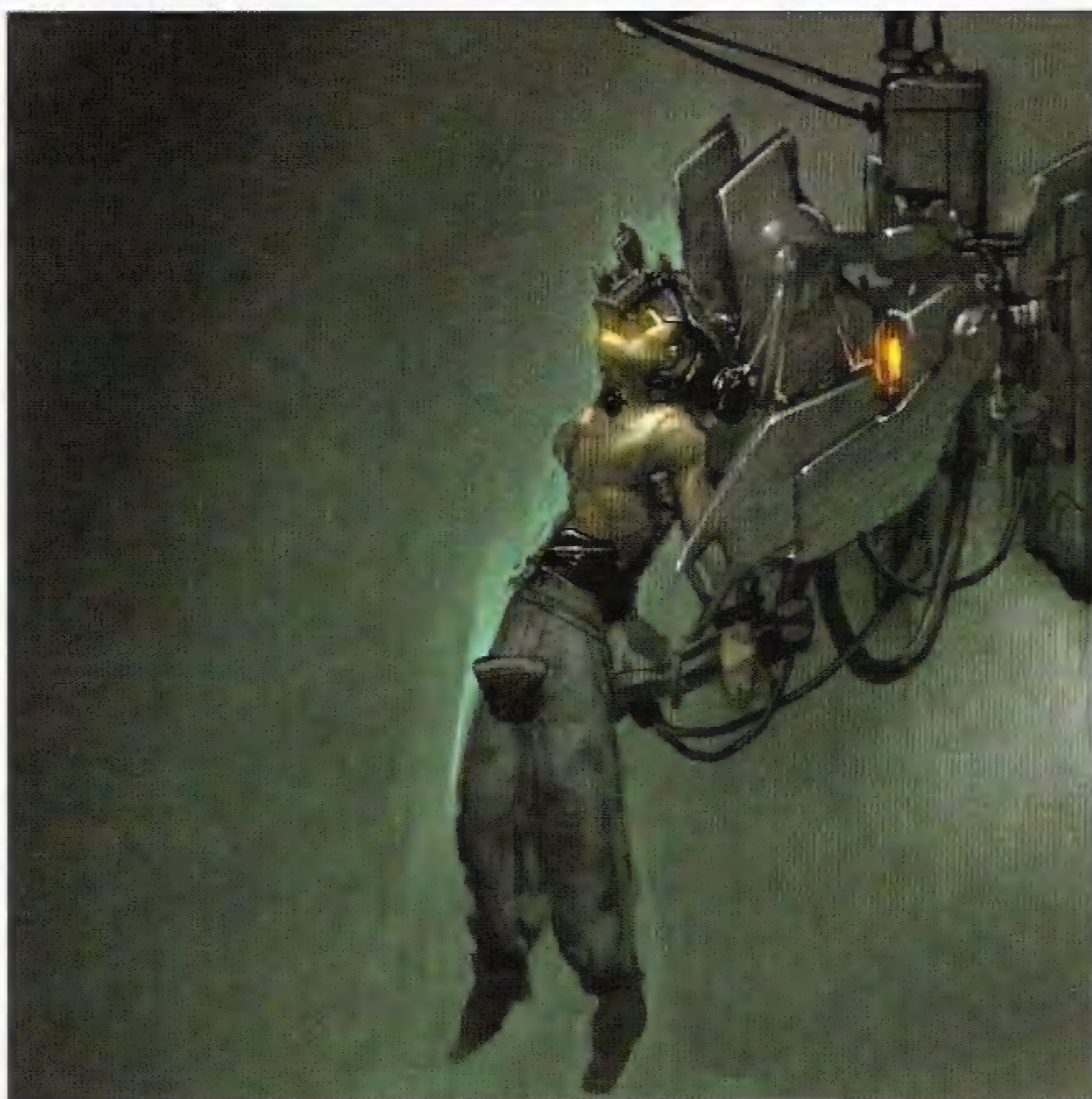
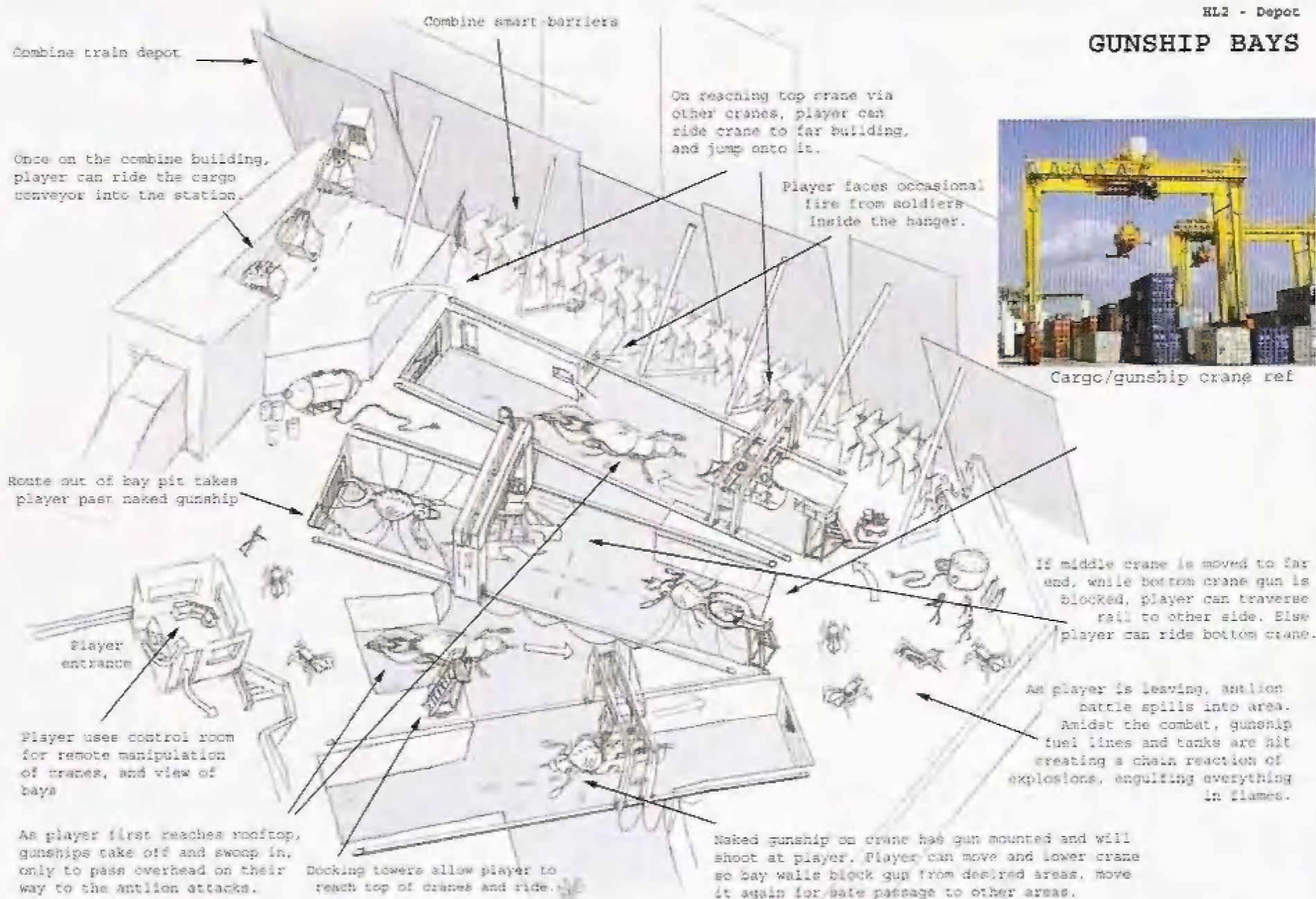
HL2 Depot
YARD

NOTE: Turrets and sentry guns indicate machinegun nests as they are vulnerable to bugbait/antlion attacks.



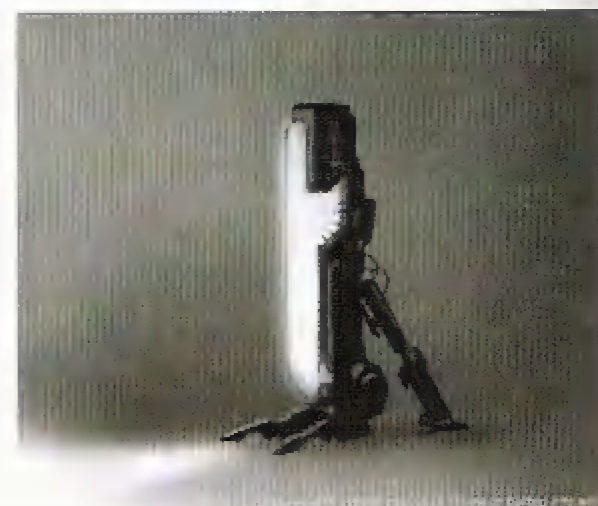
1) Bridge - shelter from guns, but player cannot see or shoot upon while sheltering
2) Ditch - shelter from gun B, and is one area guarded close enough to base of gun A that A cannot shoot either. A cannot be seen at shot from safe area, but bugbait is effective, grenades can also work (though are difficult)
3) When bugbait/antlions bring down gun A, the ditch then provides cover from B and thus a safe route to the safe-zone base of B. Repeat bugbait attack.
4) Once gun B is down, the exit corridor is no longer lethal, player can finish.

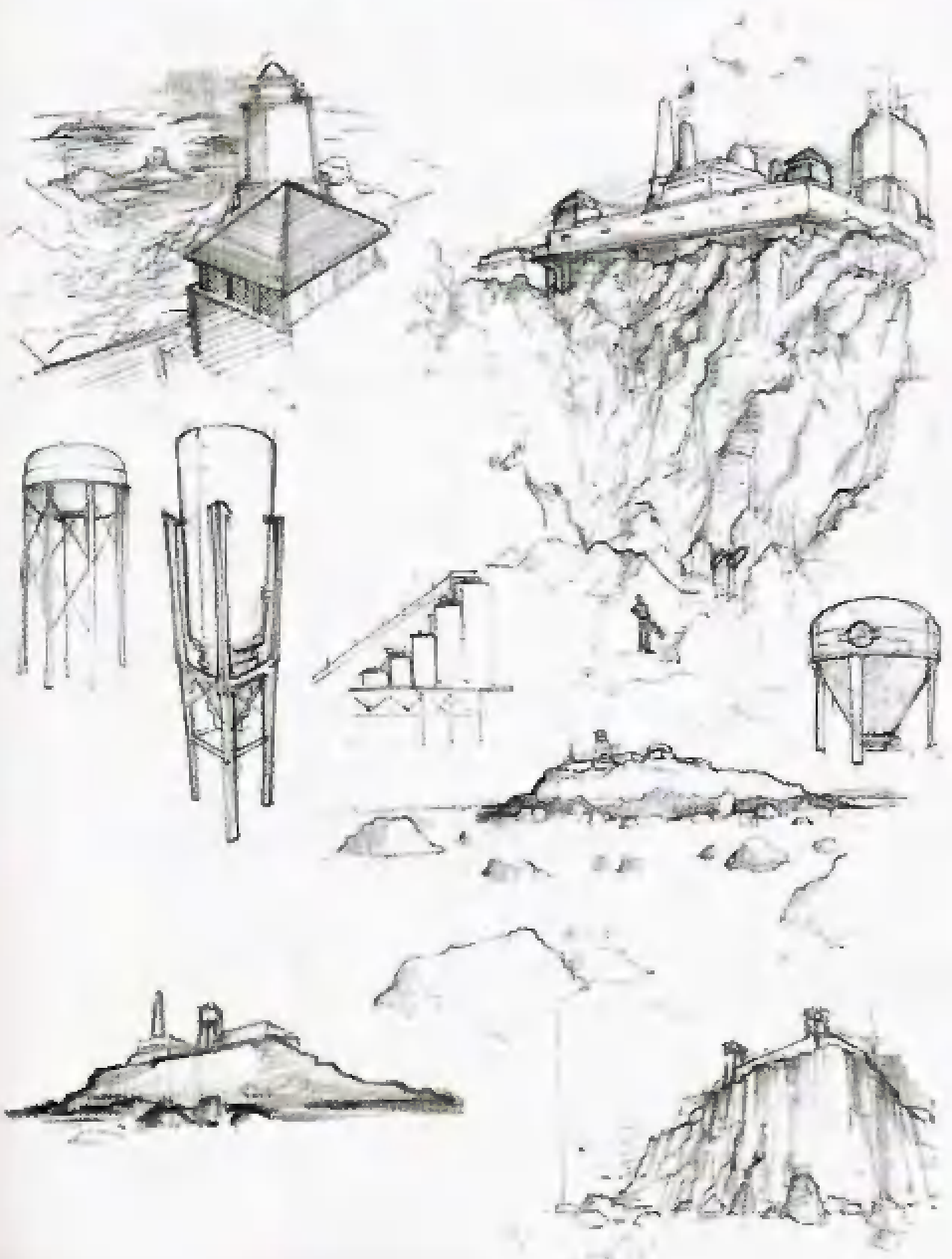
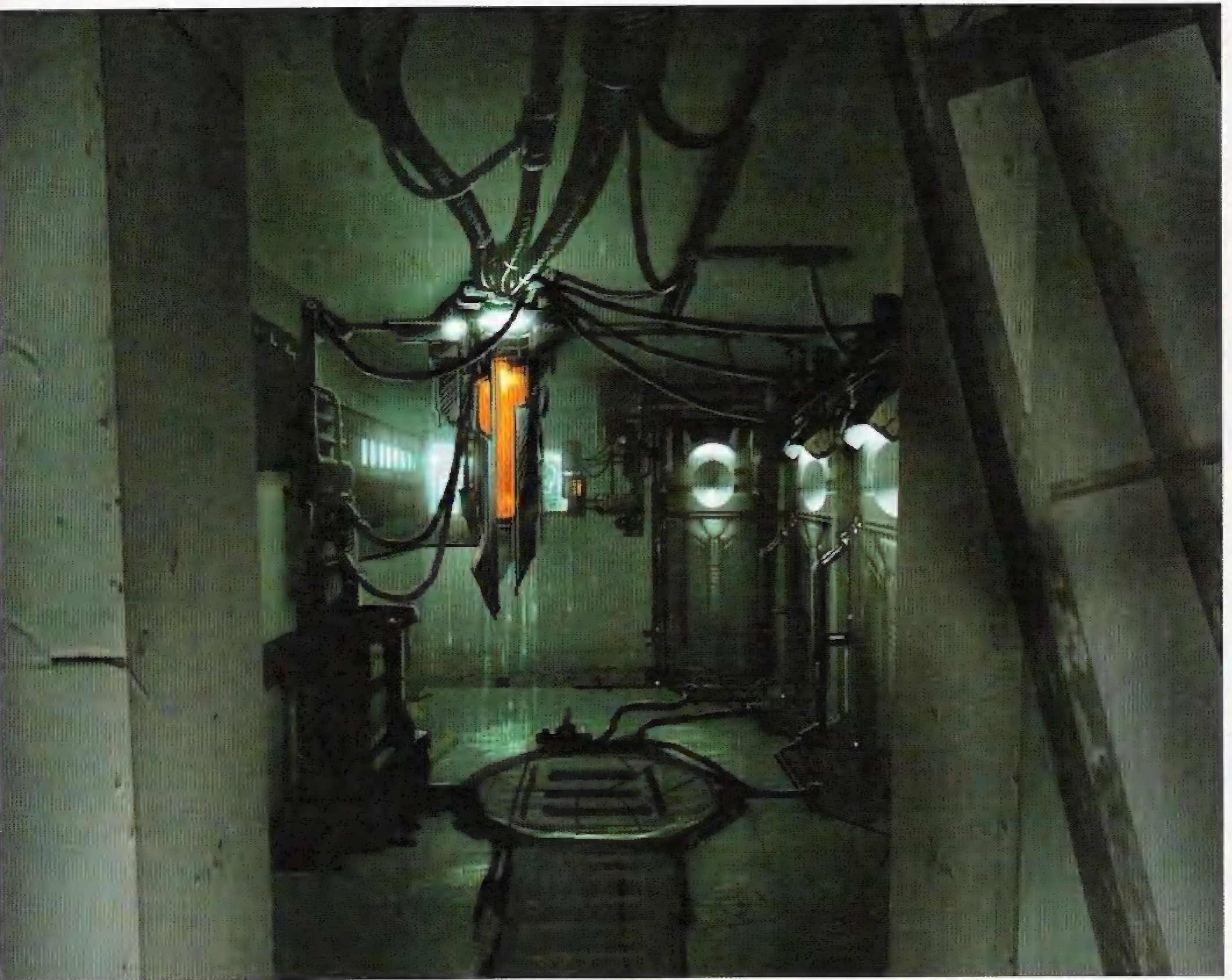
HL2 - Depot
GUNSHIP BAYS



Nova Prospekt
Dhabih Eng & Eric Kirchmer

Detailed plans for a Gunship repair bay, which went through extensive playtesting. The basic idea of the Gunship repair area was reduced to a footnote, glimpsed during the player's journey through the Citadel.







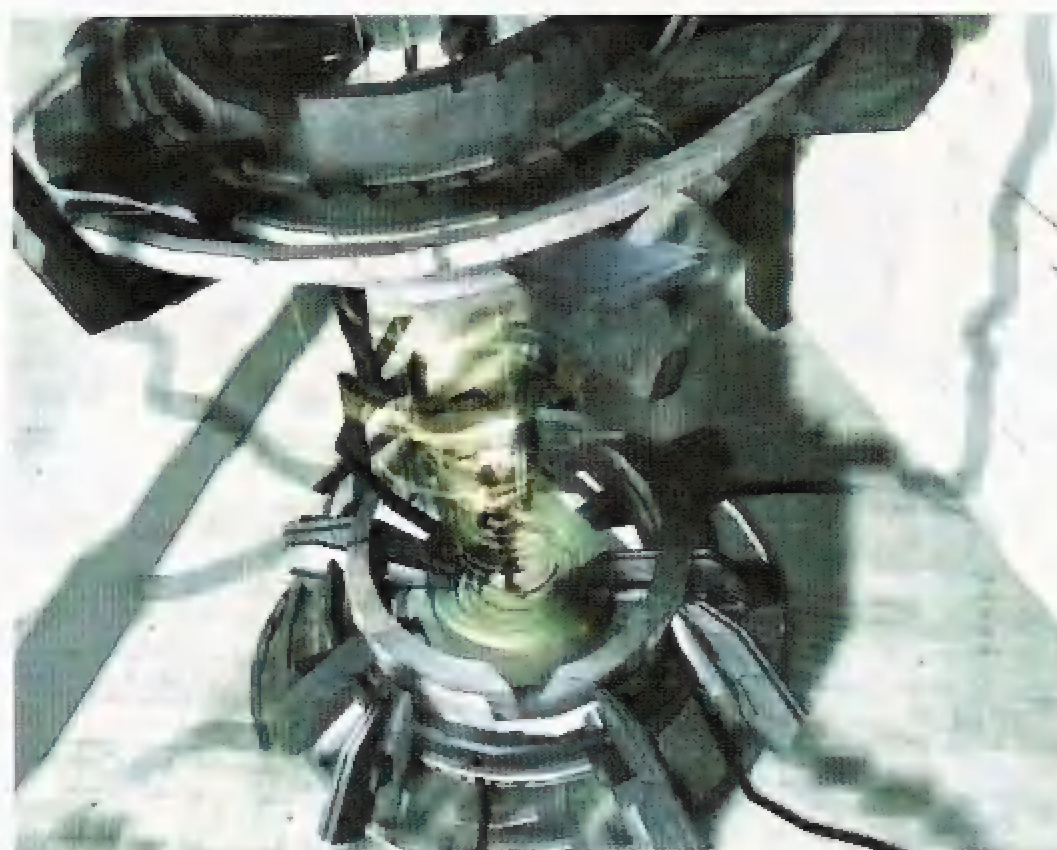


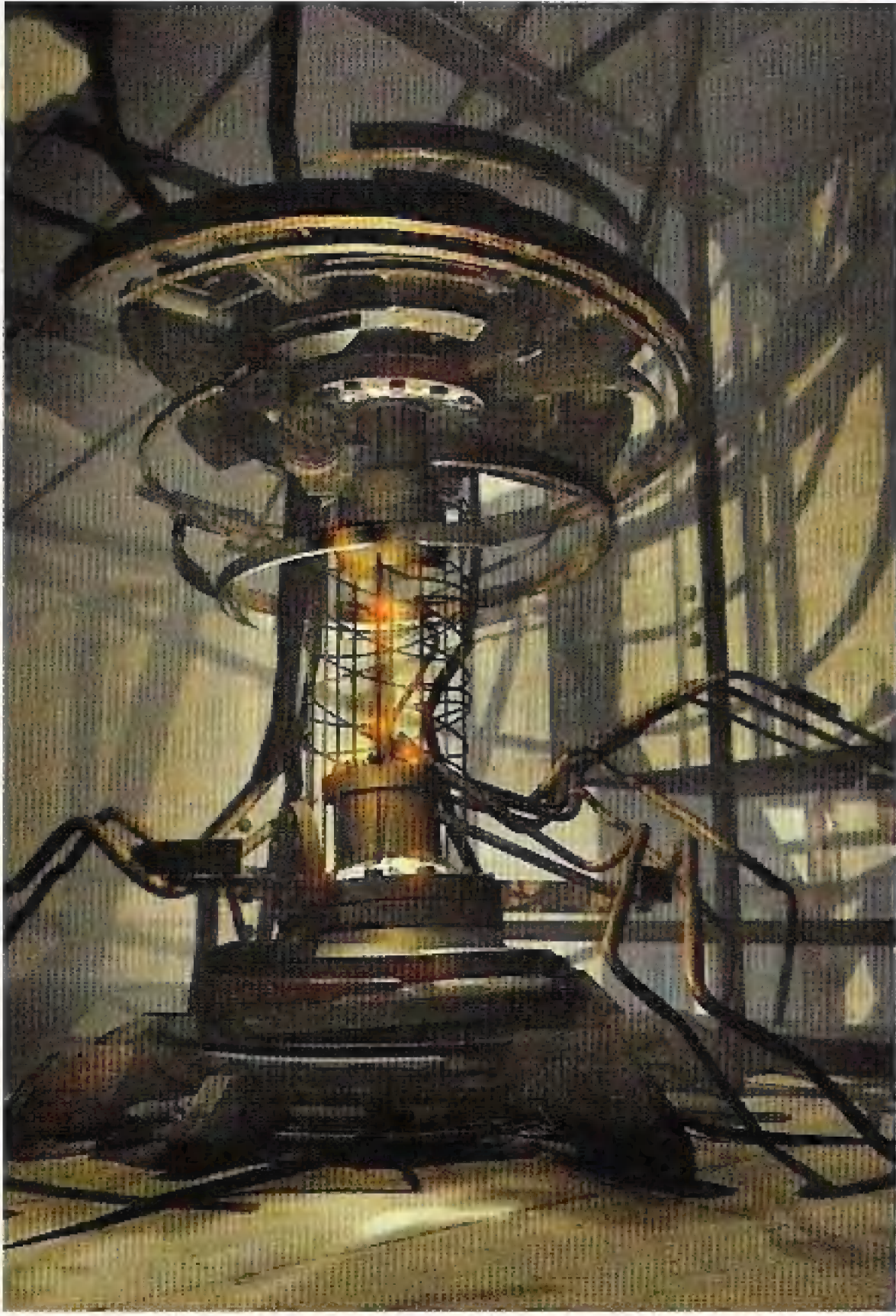


Teleporters

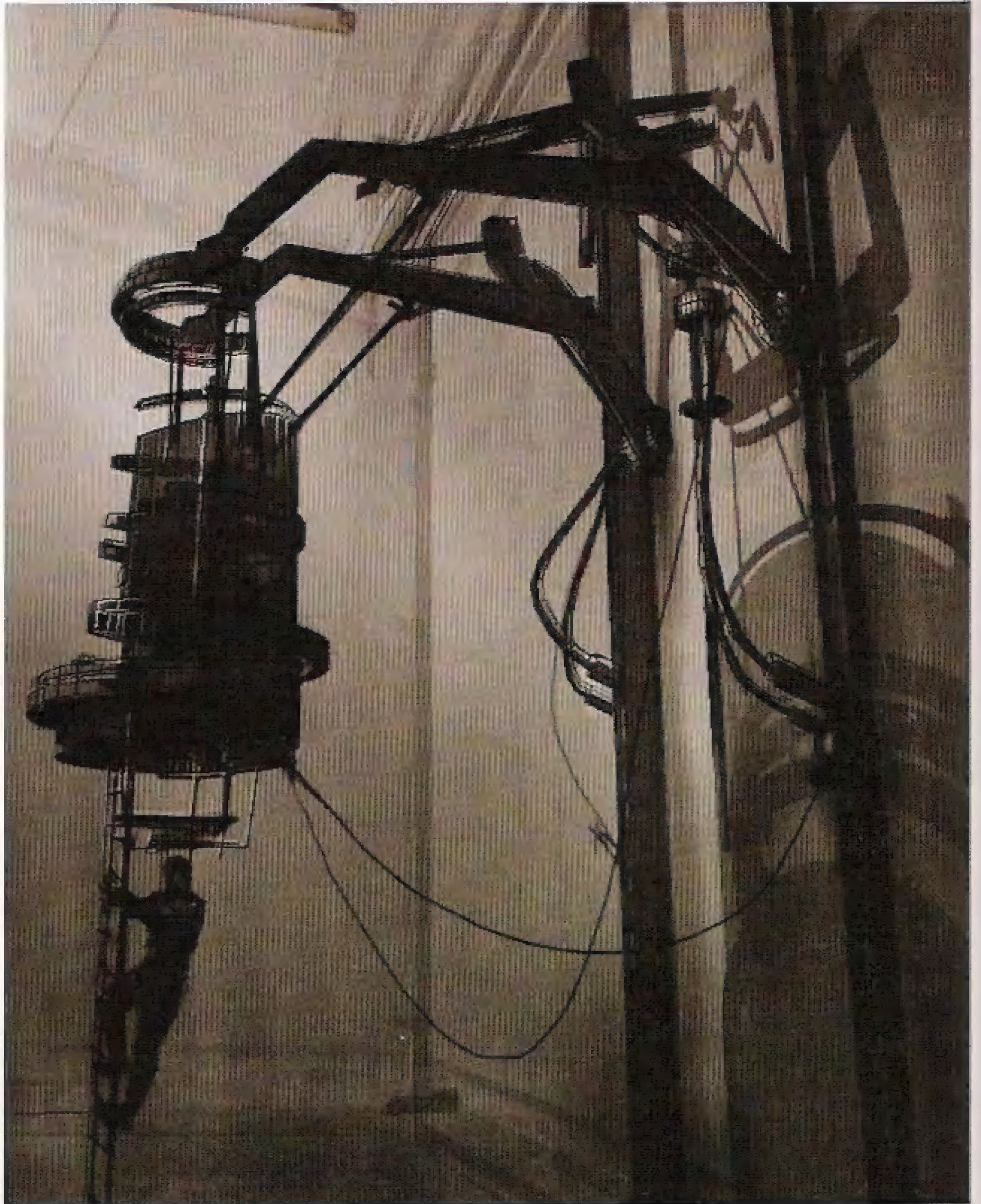
Viktor Antonov

As the player draws closer to the Citadel, there is a progression from purely human forms to overwhelmingly alien environments. This is reflected in the crucial teleport technology shown throughout the game, from Dr. Kleiner's and Eli's crude, jury-rigged teleports, to the polished Nova Prospekt teleport, and finally to the immense portal at the heart of the Citadel. Designing these devices so they shared similarities, yet were visually distinct as a reflection of their creators, was a challenge for the artists.





Teleport Studies
Viktor Antonov





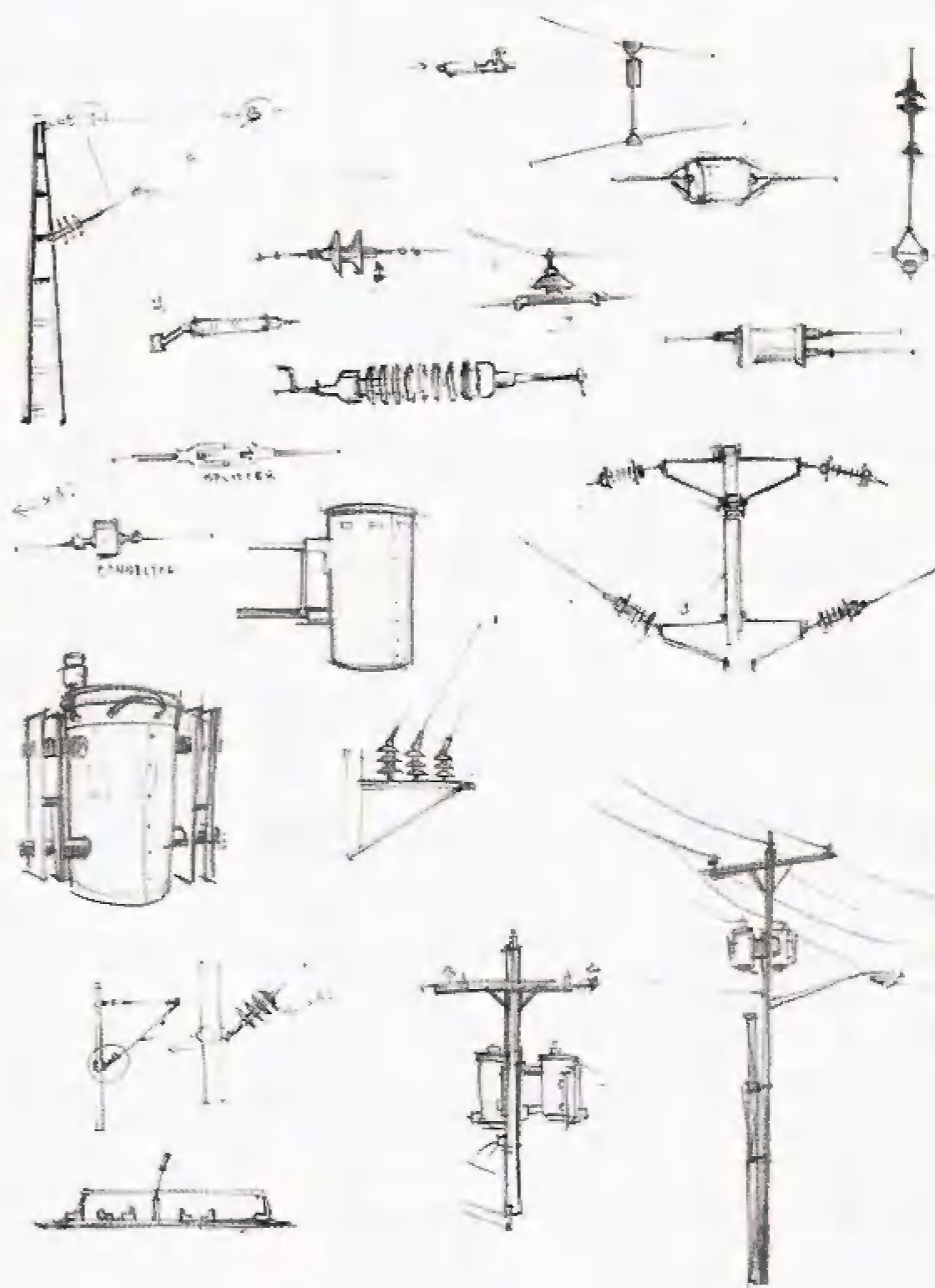
One of the few successful and surviving bits of City 17 propaganda, this design was influenced by Russian and American wartime posters. The amount of printed matter posted on city walls was reduced in favor of omnipresent electronic "Breencasts."

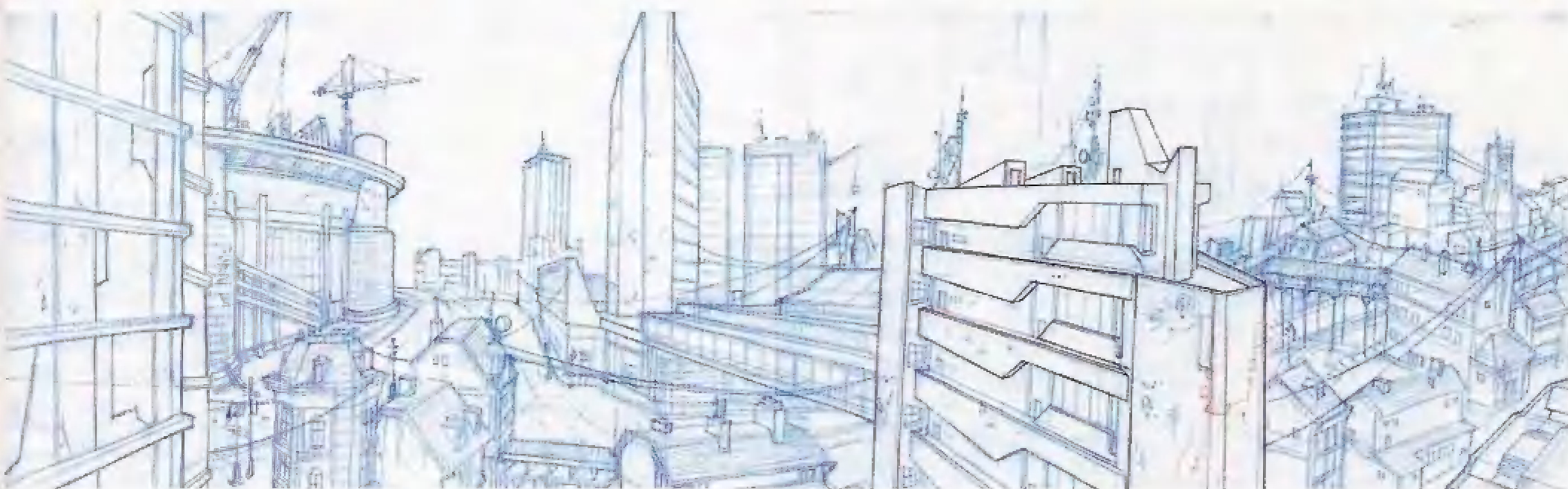
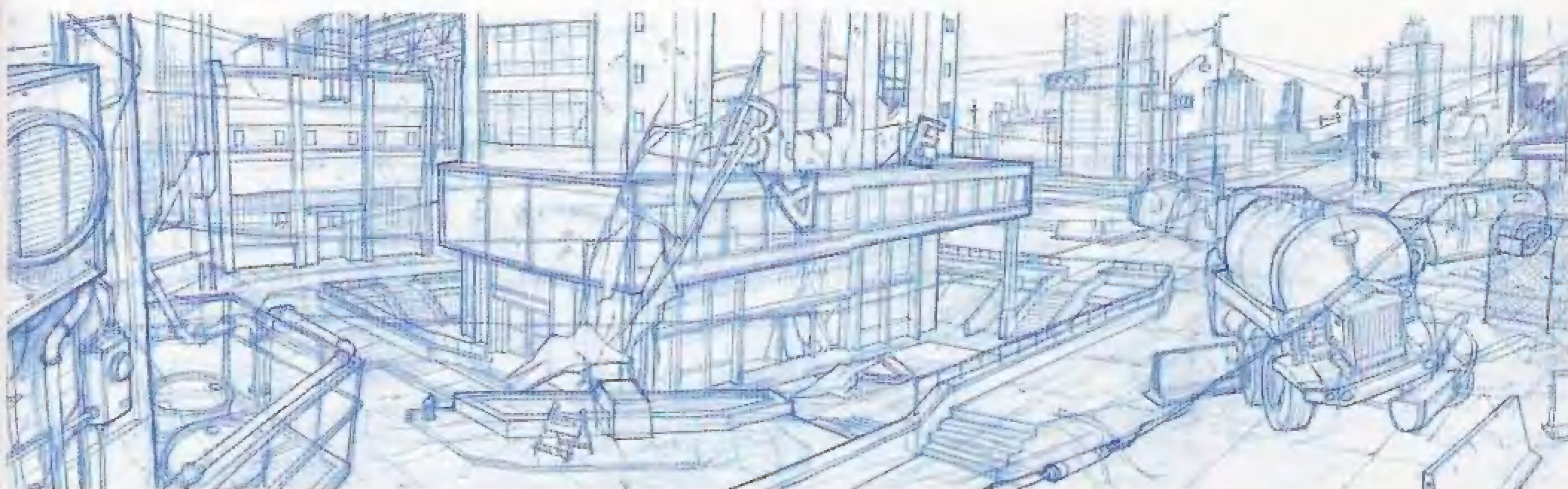
City 17

Damarcus Holbrook, Tri Nguyen, & Eric Kirchmer

A significant element was chosen for each set of levels and repeated until it became a theme. City 17 is filled with wires, antennas, and smokestacks. The rooftop area in *Half-Life 2* started out as structures that were seen from afar, but because of gameplay and visual potential, it turned into a part of the player's path.

"We have three sizes of objects in the world, and we have a formula of what makes a level look balanced. There are the large, medium, and tiny objects. This is the basic formula. We have to check on each one that's built to match the level of detail. First, we start off with city blocks, large girders, and big architectural designs. Then we went down to ornaments, antennas, and trees. Then we went down to trash, posters, and little decals." - Viktor Antonov

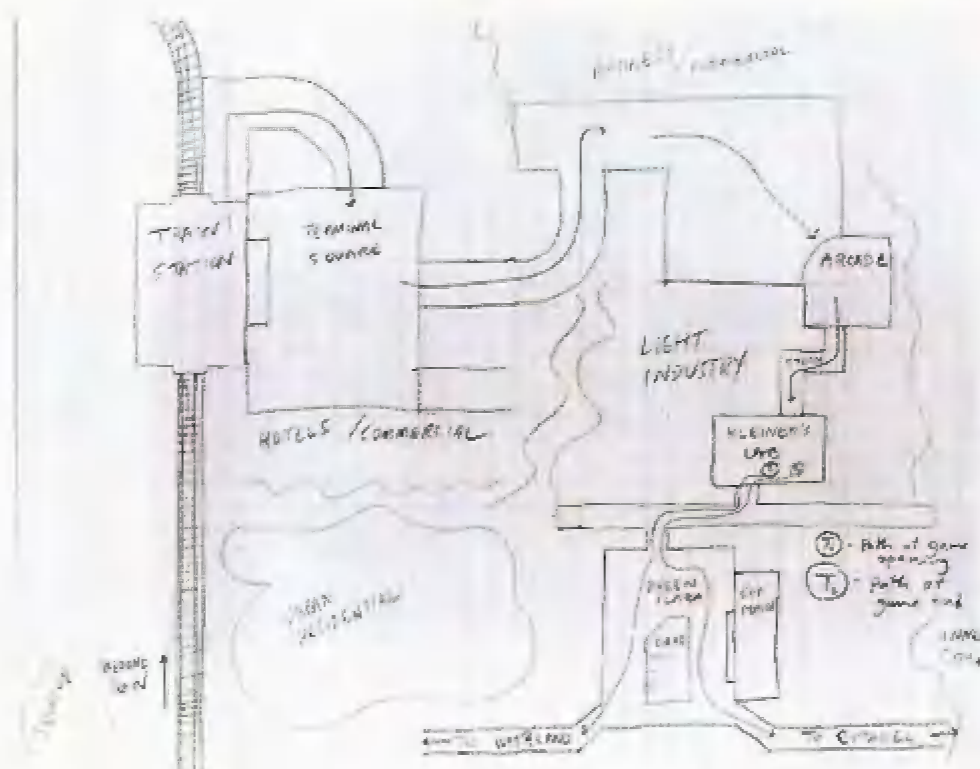


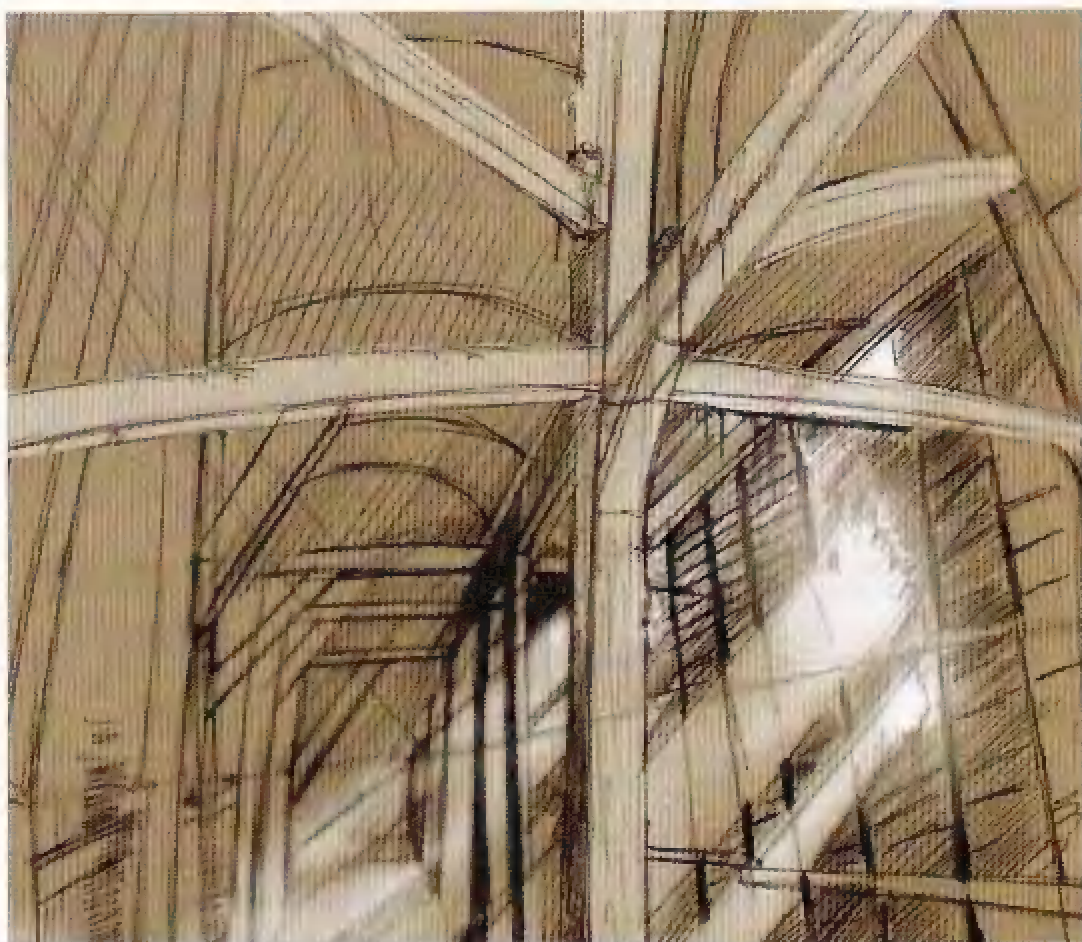


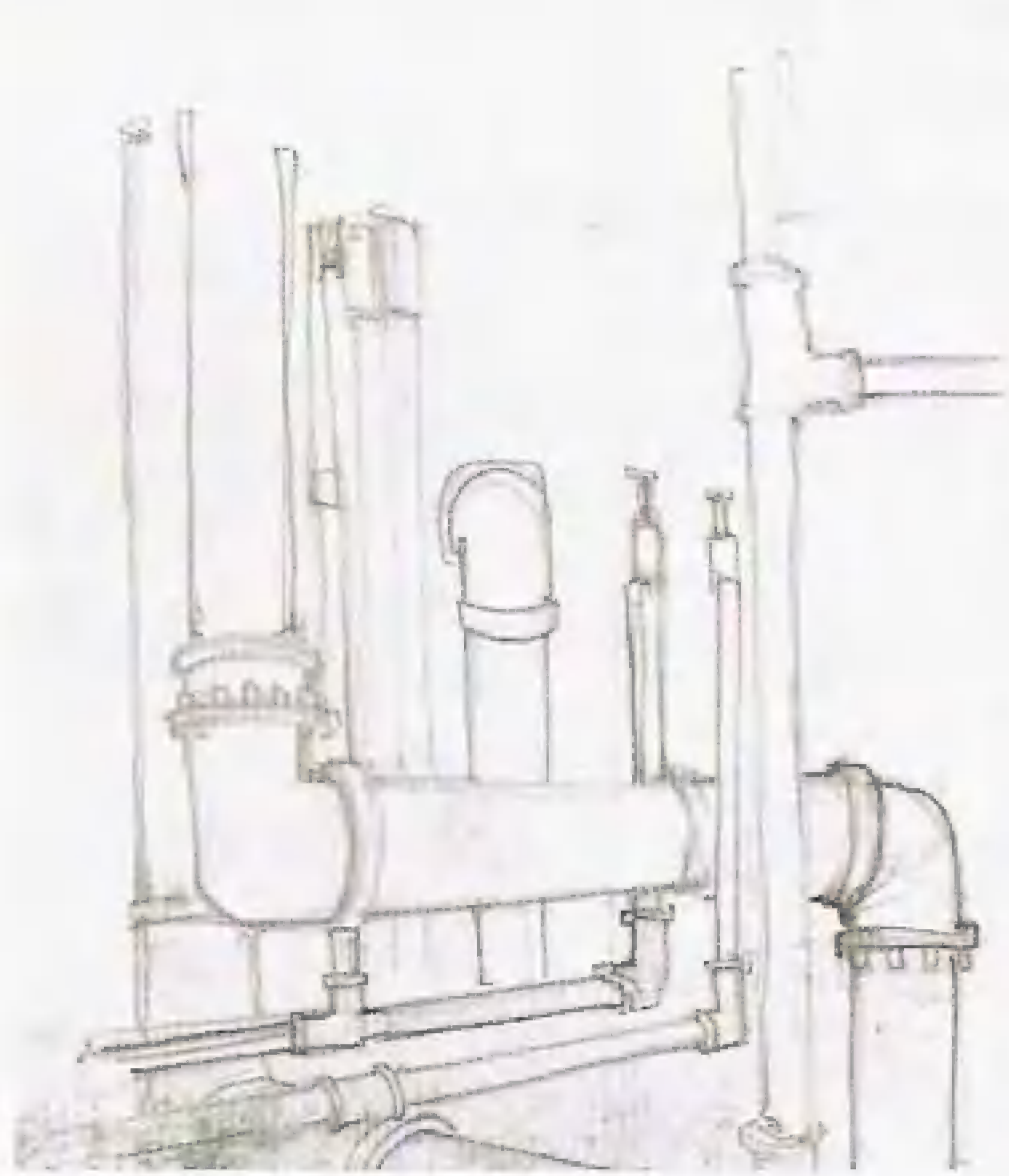
"I think we had somewhere around 4,000-5,000 textures and 2,000-3,000 models two years ago. I've lost count. If anything, we created too many assets for too many areas. We joked about how we could put together an entire series of architecture CDs and sell bottles or benches or chairs."
- Randy Lundeen

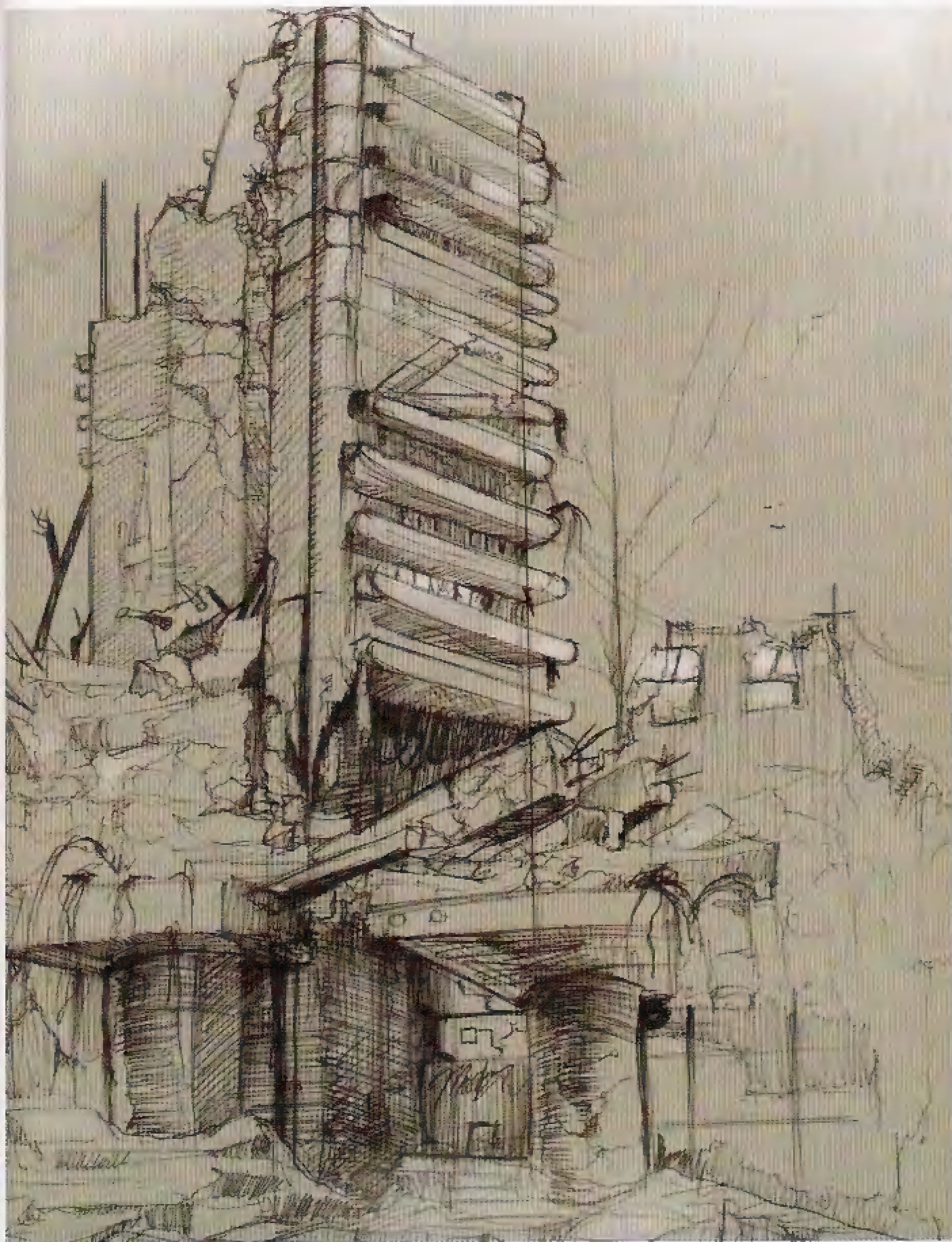
Opening Sequence Flowchart

This map of a small section of City 17 shows an early plan for the route from the Trainstation to Kleiner's lab. Much of this route was built at one point, but the path was so long that it would have made the exploratory phase of the early game tedious. In the final game, the player essentially enters the Terminal Square, then walks around the back of the Trainstation to find Kleiner's Lab.





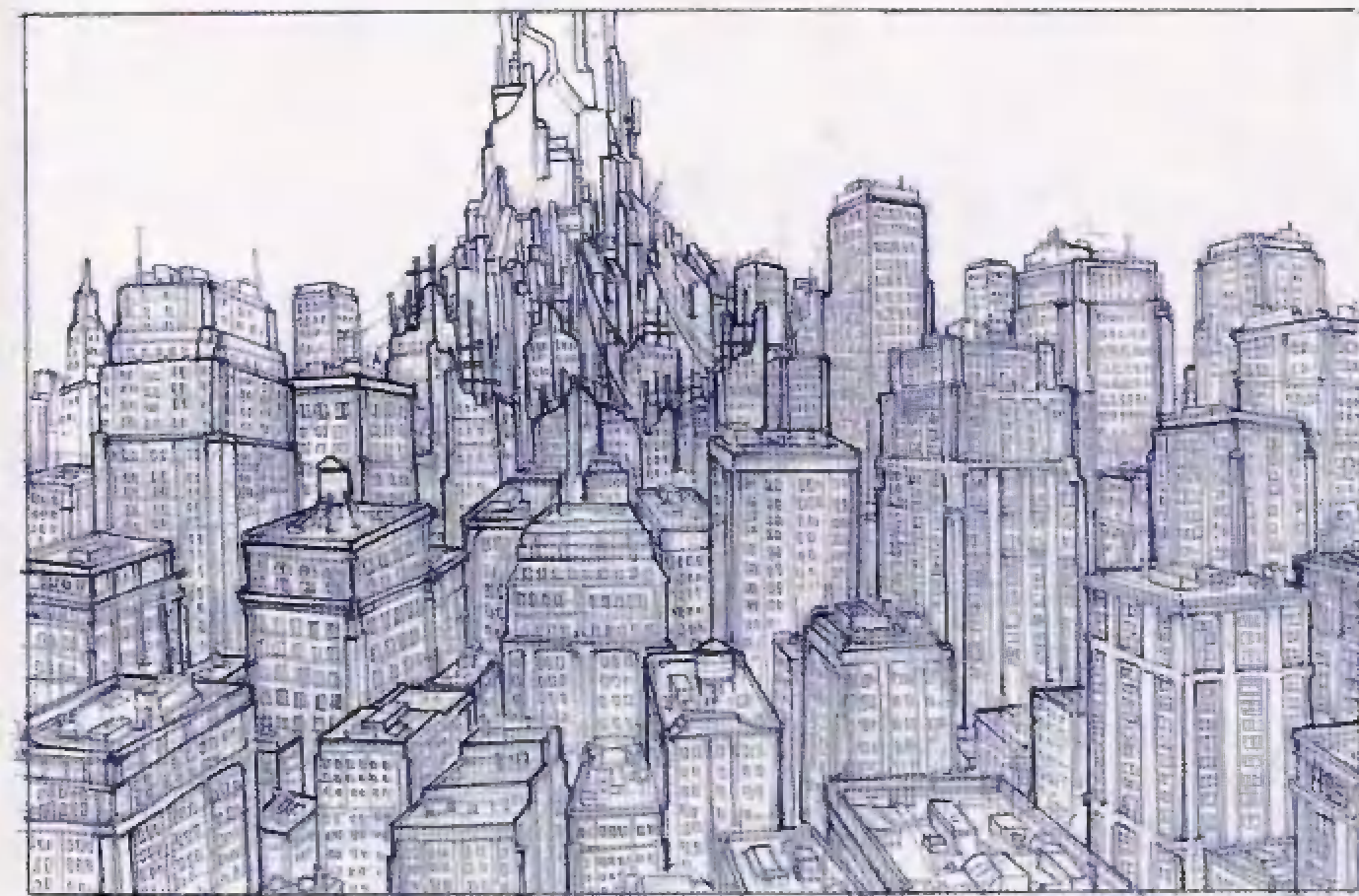




Destroyed City 17

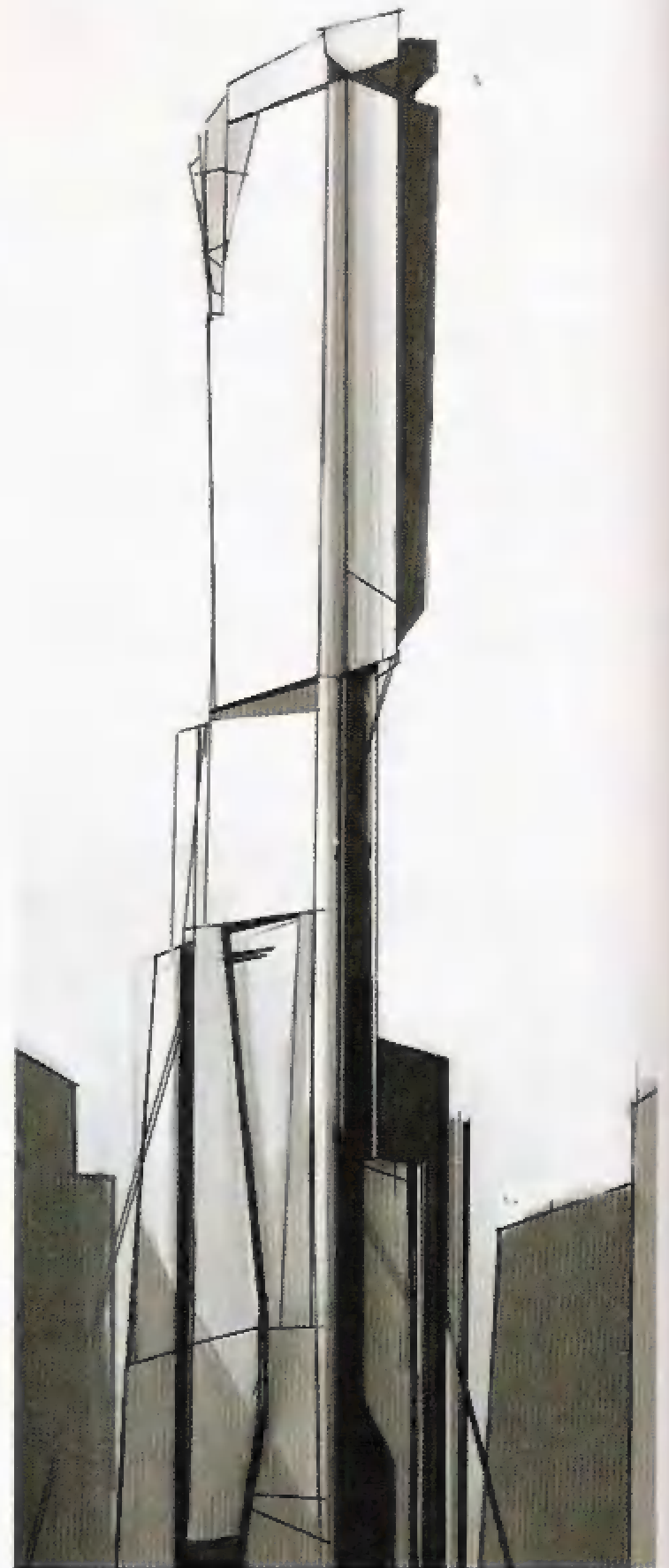
Eric Kirchmer & Damarcus Holbrook

To construct the destroyed city portion of the game, designers built low-detail buildings in the world editor Hammer, then took them into the Softimage XSI and “destroyed” them, breaking them up and adding details like rebar and cracks.





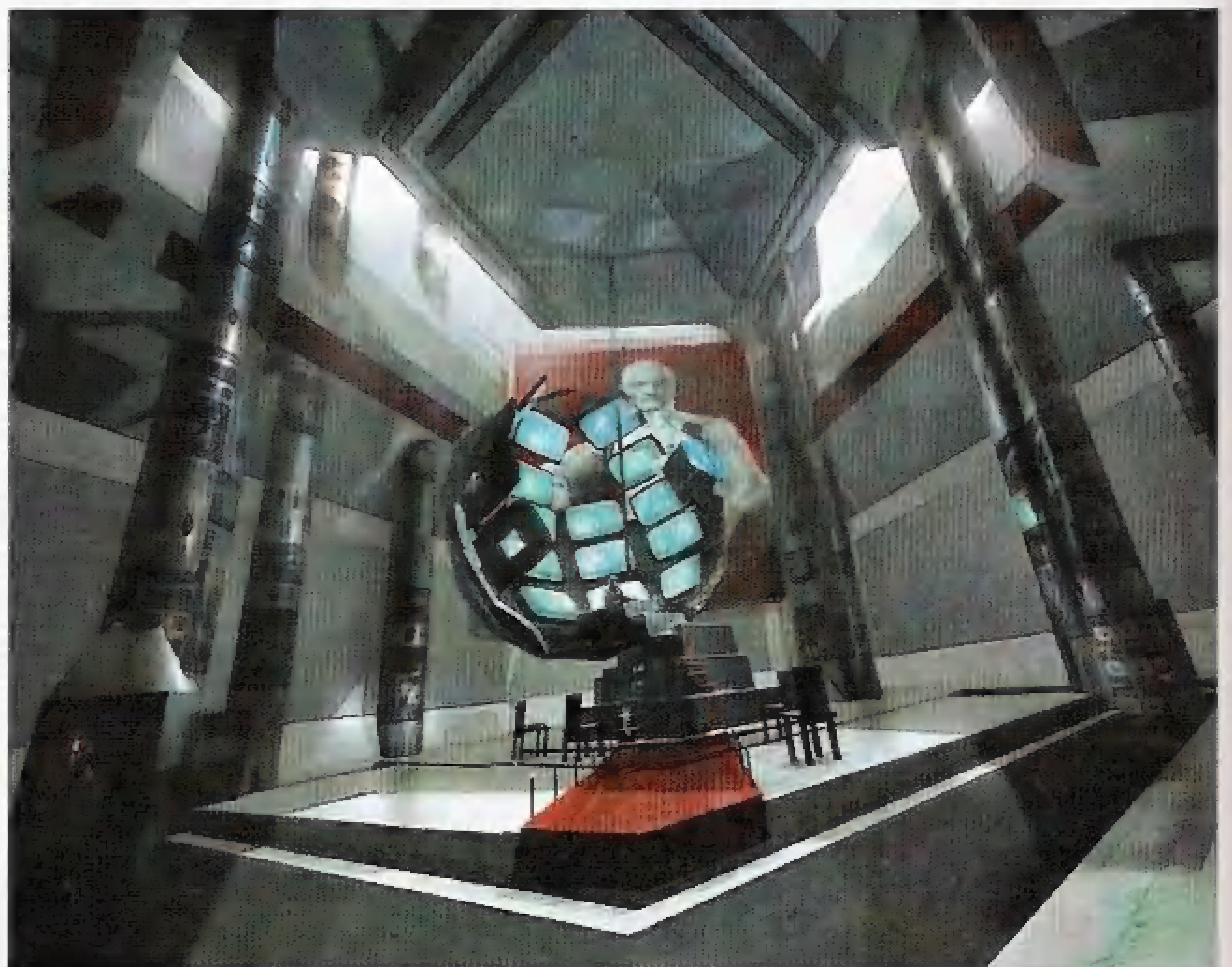




Citadel Interiors

Jeff Ballinger & Viktor Antonov

The Citadel interior design was influenced by the monumental totalitarian architecture of Nazi and communist regimes. One difference from these realistic sources is the broken symmetry, which creates a sense of tension.







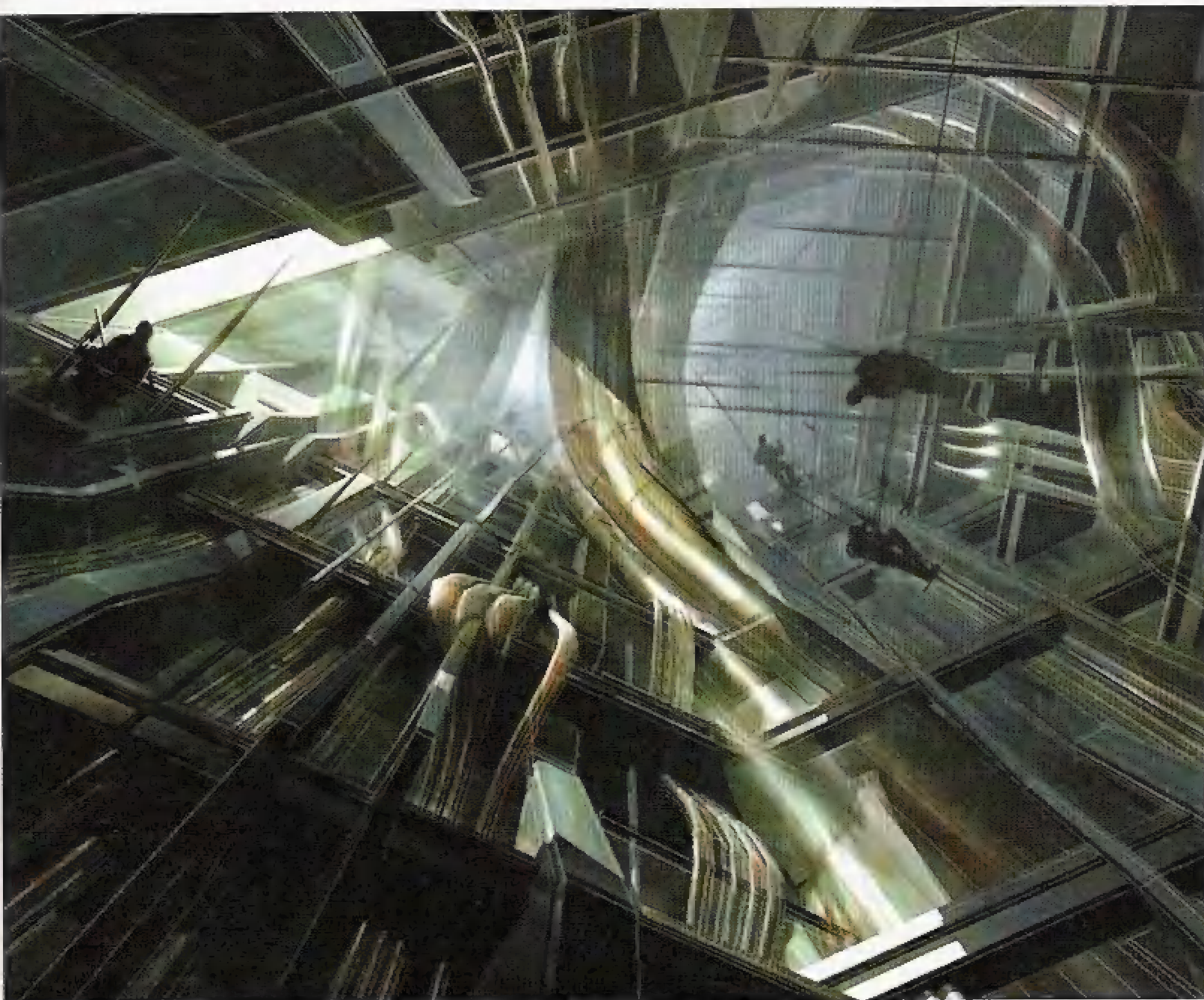
Citadel
Viktor Antonov

Early concepts of the Citadel showed it to be a graft of alien architecture forced upon recognizable European building styles.



VALVE





Citadel

Viktor Antonov

The “pods” whereby humans were transported throughout City 17 and the Citadel were another crucial part of design, as they were glimpsed in the very opening of the game, but only became completely clear in the final act. Valve designers wanted them to be intriguing but not reveal too much.







Half-Life 2: Final Sequence

06

As might be imagined of a process where cutting edge technology drives both game mechanics and fine art, the process of making games requires a steady series of small steps and a number of huge intuitive leaps. The process is an iterative one, in which no creation lasts very long without being thoroughly tested, criticized, revised, and tested some more. Wild proposals and crazy ideas—for gameplay, for settings, for characters—are a constant part of the atmosphere at Valve, yet there is common agreement that even the best idea should not break the continuity and consistency of the game. The ultimate test of any idea is how well it plays in an actual level. The level is the place where it all comes together: gameplay, art, acting, every piece of the puzzle. The tricky part is building the separate pieces simultaneously, while trying to anticipate the ultimate shape of the game.

Half-Life 2 Cabals

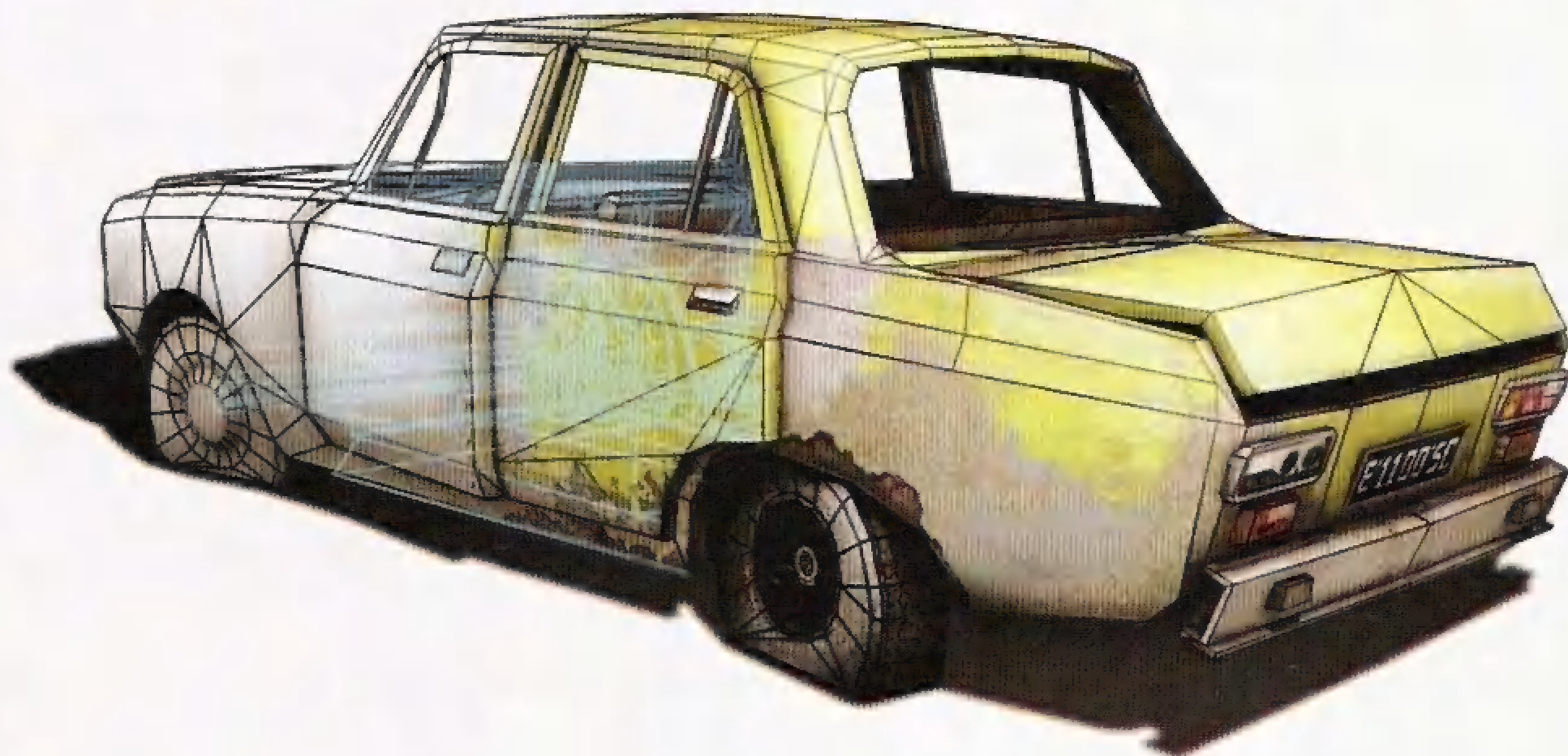
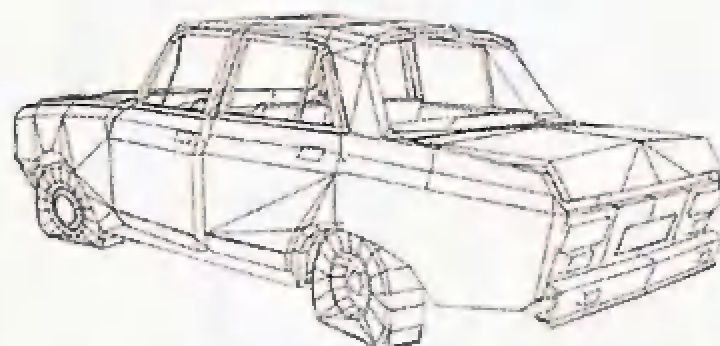
Around the beginning of 2003 it became apparent that the problem of creating *Half-Life 2* was far too large to treat monolithically. The team needed to break up into smaller groups and focus individually on an area, so that each person would have less breadth to worry about and thus could focus more deeply on their work. These cabals would be nearly self-sufficient teams, such as an animator, two programmers, and two level designers. Three cabals were set up to work on specific sections of the game: Coast, Canals, Prison, etc. The acting sections of the game were created by a fourth cabal that worked parallel to the gameplay cabals to create the elaborate scenes that tell the story of *Half-Life 2*. This basic structure was maintained for the last year and a half of development.

Building From Reference

Eric Kirchmer

One of the goals for *HL2* was to never build anything without first researching it. The artists went on numerous research field trips, took 1000s of photographs, collected countless reference ideas from the Internet, and did many conceptual drawings and renderings. Over the six year development, they created a reference folder that has accumulated 50,000+ images.

"Sets of world models and details were created from reference photos taken from around different Eastern European cities. We would draw rough sketches and compositions to get the overall specifics of the model and then build them in 3-D. Lighting and dirt gradients were then baked into the model and applied to the material used, and an appropriate color scheme was chosen to compliment the surroundings. Once a set of models was complete, we made a prototype map or 'zoo' to composite the various models and made this accessible to level designers." - Eric Kirchmer





Rough Shelling

The rough shelling process created the "Lego" building blocks that could be assembled into environments. The important aspect was to nail down the proportions and volumes quickly with the Art Director, so artists could hand off these blocks to the game designers to use in early gameplay prototypes. The "blocks" were built on a strict grid so they could easily snap together, and the team would know that the textures would line up and be at the correct resolution.



"We put a lot of rich, relatively low-cost detail into the world. In the river sections in particular, the banks are full of high-frequency detail, like foliage, crashed vehicles, trash, rocks and logs, and deeper pools that allow the player to explore and find hidden goodies and interesting details. You might find a dead body with a bunch of goodies in a grove of cattails, or a skull in the mud at the bottom of a pool, or a special surprise in a sunken pipe. Things like this show intentionality and investment in the world on the designer's part." - Dave Riller

Style Guides

After the rough shells were created, the art team would take one or two scenes from the area and fully realize it. This entailed establishing the level of detail, placing the textures, creating the lighting prefabs, and adding atmospheric effects. All furniture, light fixtures, junk, garbage, foliage, decals, and wires were placed in this pass. These levels became the "style guides" from which the game designers drew details as they fleshed out the rest of the rough gameplay shells.



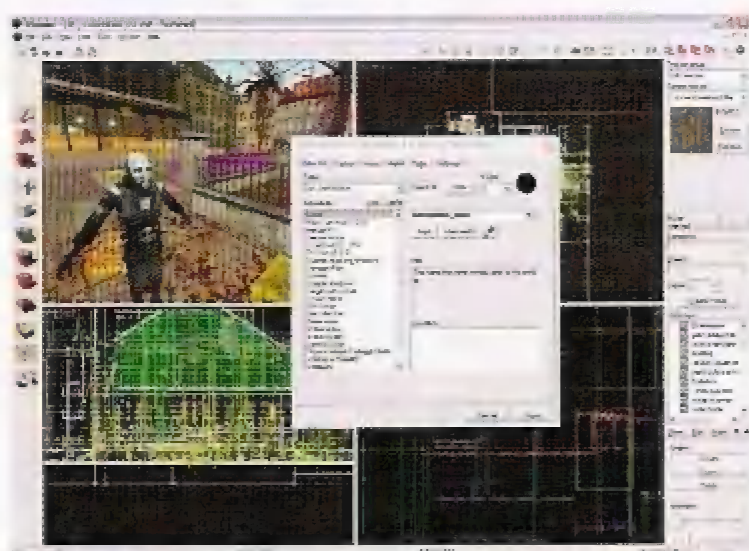
Art Integration

After the game designers finished their first pass of integrating the style guides into their rough shells, the art team would spend a few days going through each of the spaces. The team found this to be the hardest part of production...maintaining the balance between gameplay and aesthetics. Randy Lundeen and Aaron Barber were the primary bridges between art direction and game design. Their iteration process involved a lot of back-and-forth tests and compromises, especially in regard to performance.

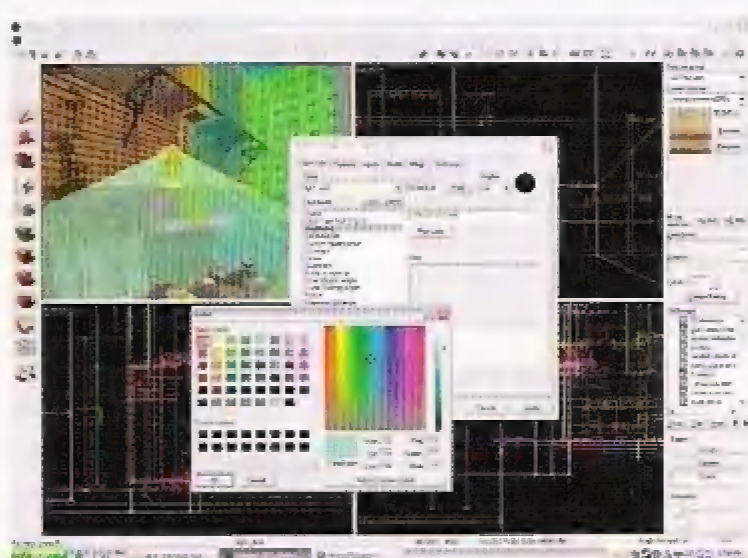
Orange Map Process

"If a level had temporary textures or artwork that could conceivably be thought of as final, people would fixate on those things instead of the gameplay. Using orange maps allowed us to clearly separate gameplay and art during the early stages of a level, and iterate much more quickly than we could otherwise. When working on a level with simple texturing and construction, we could make drastic changes to the layout of the level, changes that became very time consuming once real texturing and detail was in place. If we had a new gameplay idea that we wanted to try out, the best way to approach it was to build a series of fast orange maps, only starting to integrate real art assets as we became confident in the space and the gameplay in it."

- David Sawyer



Hammer Level Editor







"We worried about the crate cliché a lot during development. Finally we gave up, and one of the first things you see when you start the game is a crate. We figured that this was the Old Man Murray equivalent of throwing yourself to the mercy of the court."

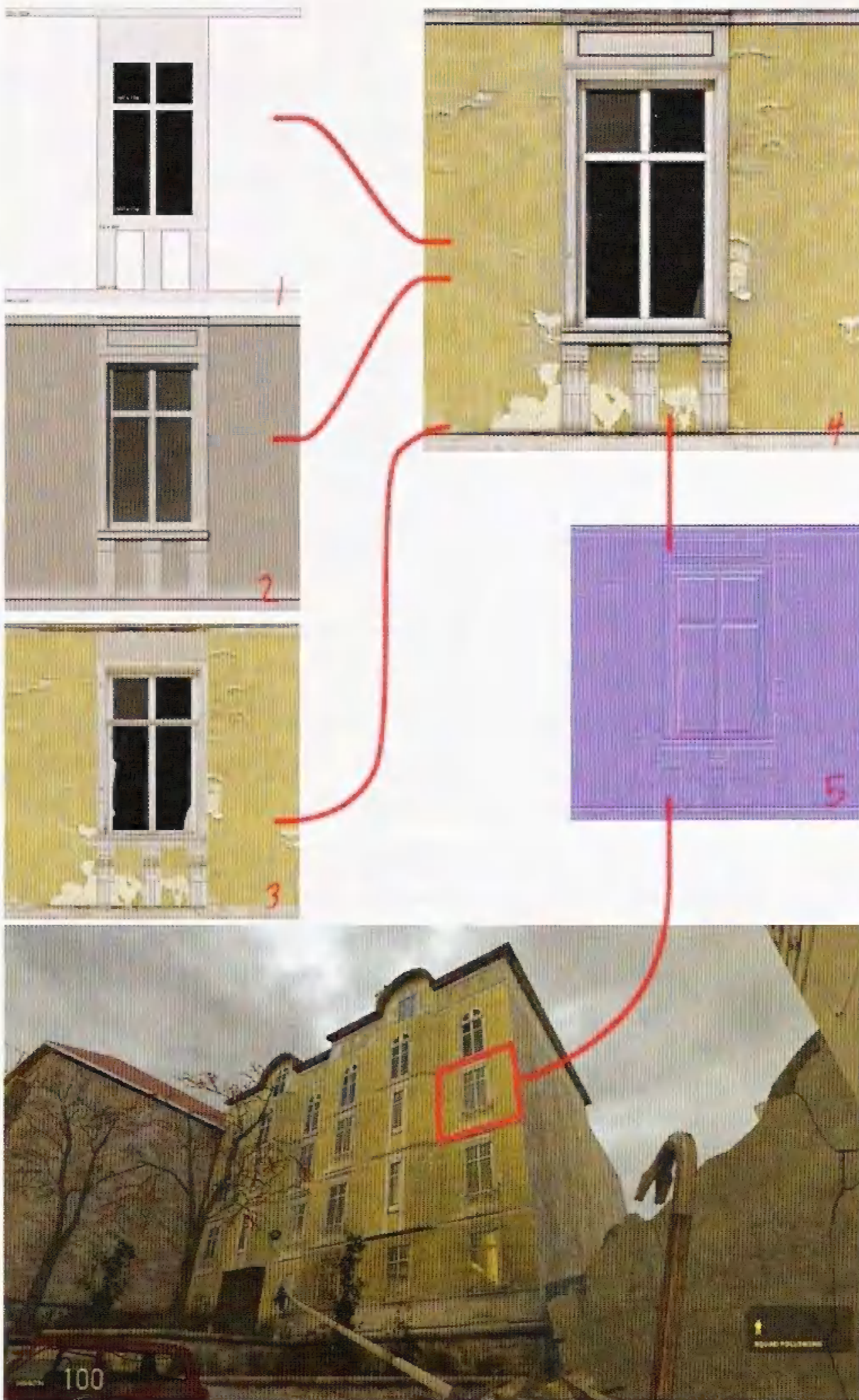
- Gabe Newell

Doctor Kleiner's lab was first fleshed out in the engine and then concept models were painted over screenshots in Photoshop.



Valve designers use this prop back lot known as the "Combine Zoo" when placing models.





The World Texturing Process
Jeff Ballinger

- .01 Artists first establish measurements and placement.
- .02 Next they build the texture in 3-D and render out shadows, values, and shapes.
- .03 Then they add color information, by either painting it in or using photos from the reference set.
- .04 This gives the final texture.
- .05 Finally, normal maps are added to create bumps.

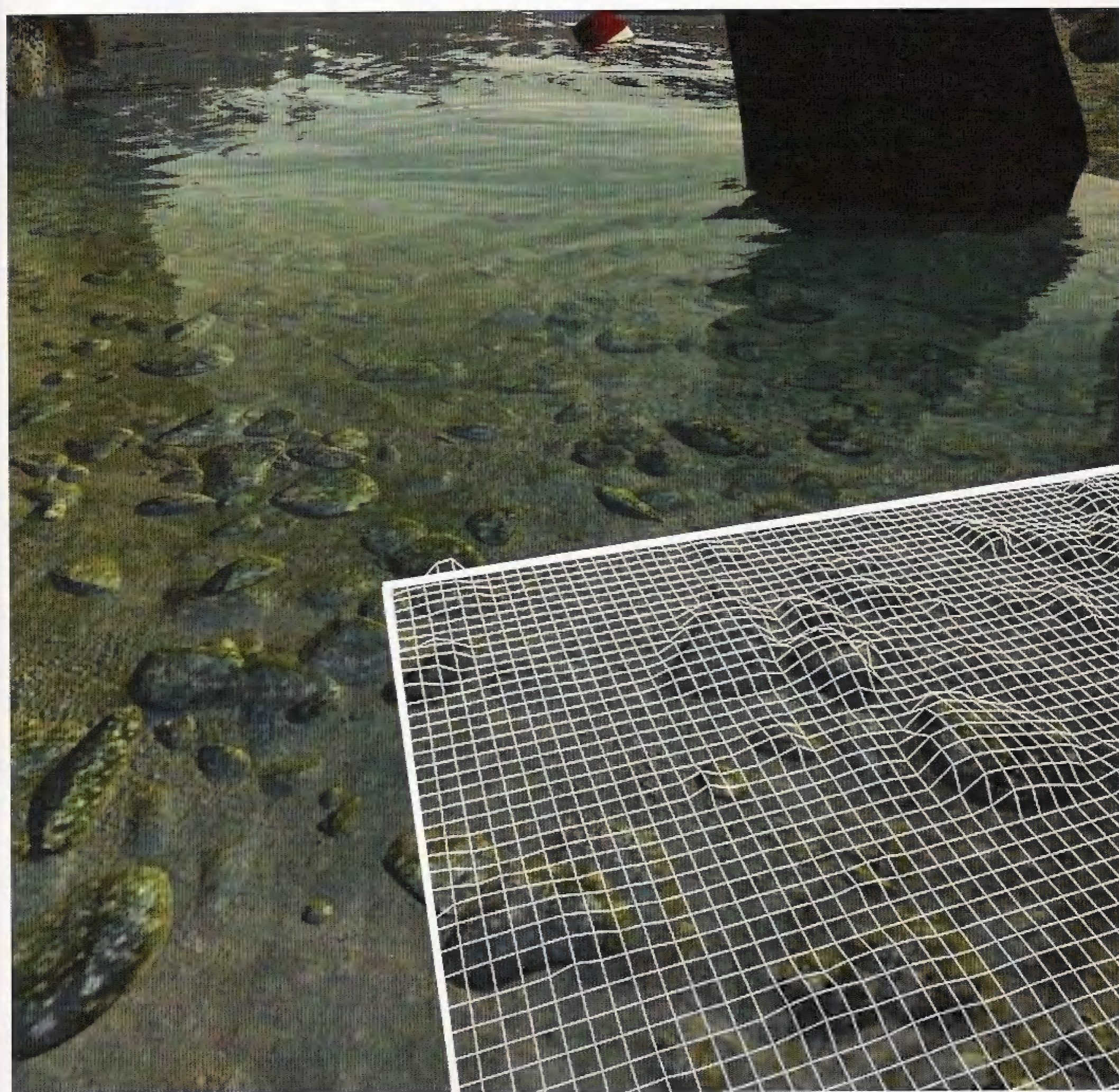
Bump Mapping

With the bump mapping firmly seated in the Source engine, Valve graphics guru Gary McTaggart handed off normal map-generation work to the artists. This technique allows for depth (such as wrinkles or bumps) in the world and model textures for a less flat look. In the scene below, one single set of texture maps produces the coastal rocks, rather than models or world geometry.

"Jeff Ballinger created most of the materials/textures on the world geometry in the game. In the month after we decided to go ahead with bump mapping, he did a huge number of bump maps for the world materials. Most were built by modeling the surface geometry to get a much higher level of detail than we could get with geometry alone." - Gary McTaggart

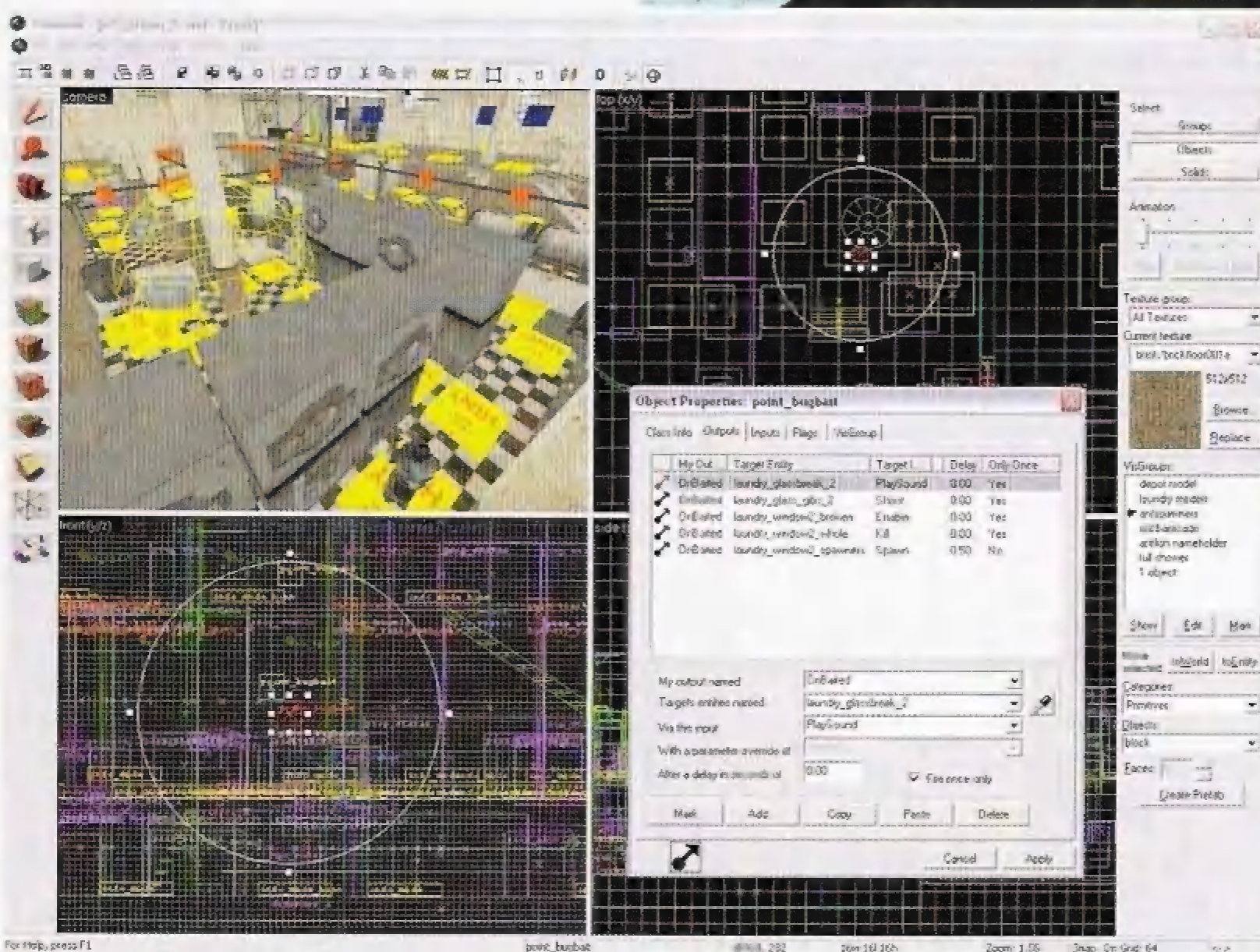
Shaders

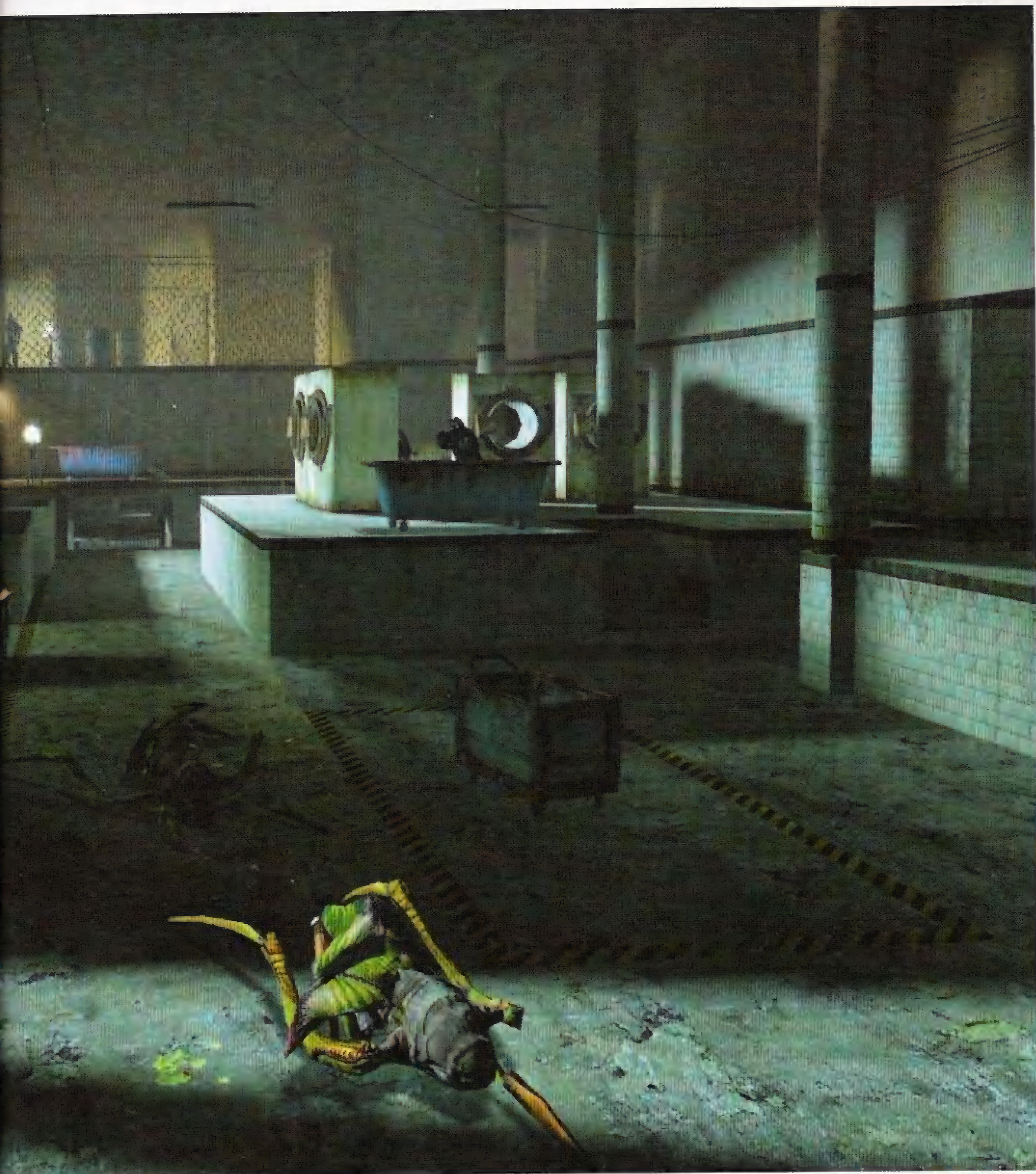
"Shaders have been pretty big in the movie industry for quite some time. The idea behind a shader is that the appearance of a surface can be defined separately from the geometric shape of the surface. In our system, we consider a shader to be the algorithm with which surfaces are rendered, and a material is an instance of a shader along with a set of artist parameters. Being able to keep shading separate from the geometry gives our content people the ability to place a set of shading algorithms on any piece of geometry." - Gary McTaggart



"Before I start building a level using the editor, I try to absorb as much information as I can about the space I need to build. This information usually comes from looking at collected images, books on architecture or photography, watching movies or documentaries, or going to a location to take pictures. Once I feel I have enough information about an area, I'll begin a layout by either a rough sketch on paper or by blocking out a rough layout in the editor. When I'm finally ready to start working on a level in the editor, I usually begin building the entire layout rather than building one area at a time, or room by room. I work from big to small, meaning I think of the overall big picture of the entire level first, then slowly refine and add the finer detail later. First, I work on space and composition, and I don't worry about final texturing, geometry, or lighting. As the level matures, I work on it iteratively, breaking down the space into smaller problems. I have found using this approach to be the most productive because problems with the design can easily be solved or changed along the way before putting a lot of time-consuming effort into polishing or finishing areas that may need to be reworked or have a design change before the level is complete."

- Aaron Barber





Final Polish

In the final phase of production, the art team would take each map for art and design tuning. At this point the levels had gone through numerous gameplay iterations, and external playtest feedback had been integrated into the spaces. The team also ensured overall consistency by evaluating textures, props, lighting temperature and intensity—polishing up virtually every visual element of the level.



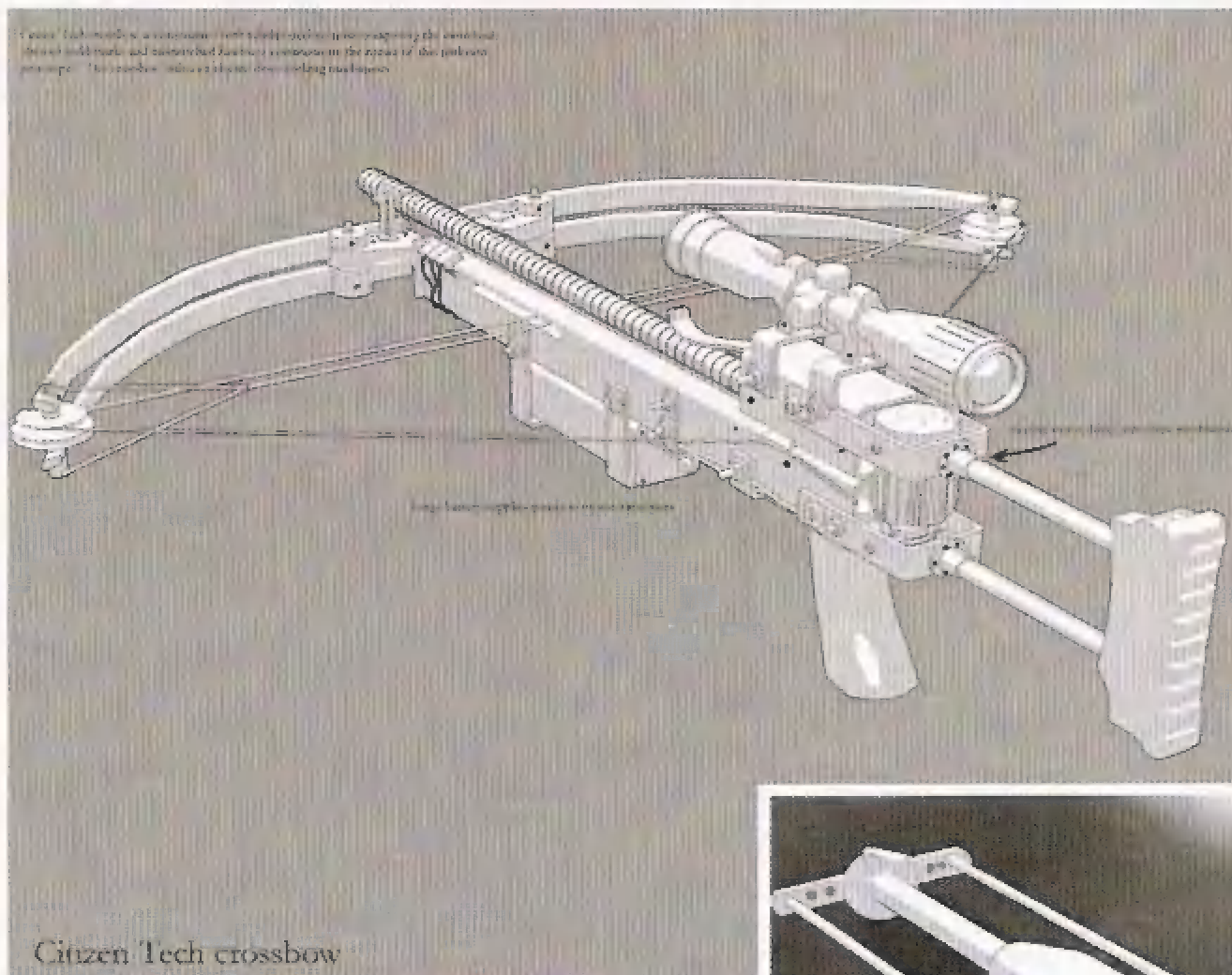
Tenement Block

Playtests are an integral part of the Valve development process. As soon as possible, every scenario in the game was prototyped and playtested with a developer watching the playtester. As development continued, each design decision was constantly validated by performance in playtests. Playtesters were recruited from team members working on other parts of the game, from employees working in other departments at Valve, and through various contacts outside the company. Designs that were not successful in playtests got changed. This is an iterative process that ensures the end product is something players will enjoy.

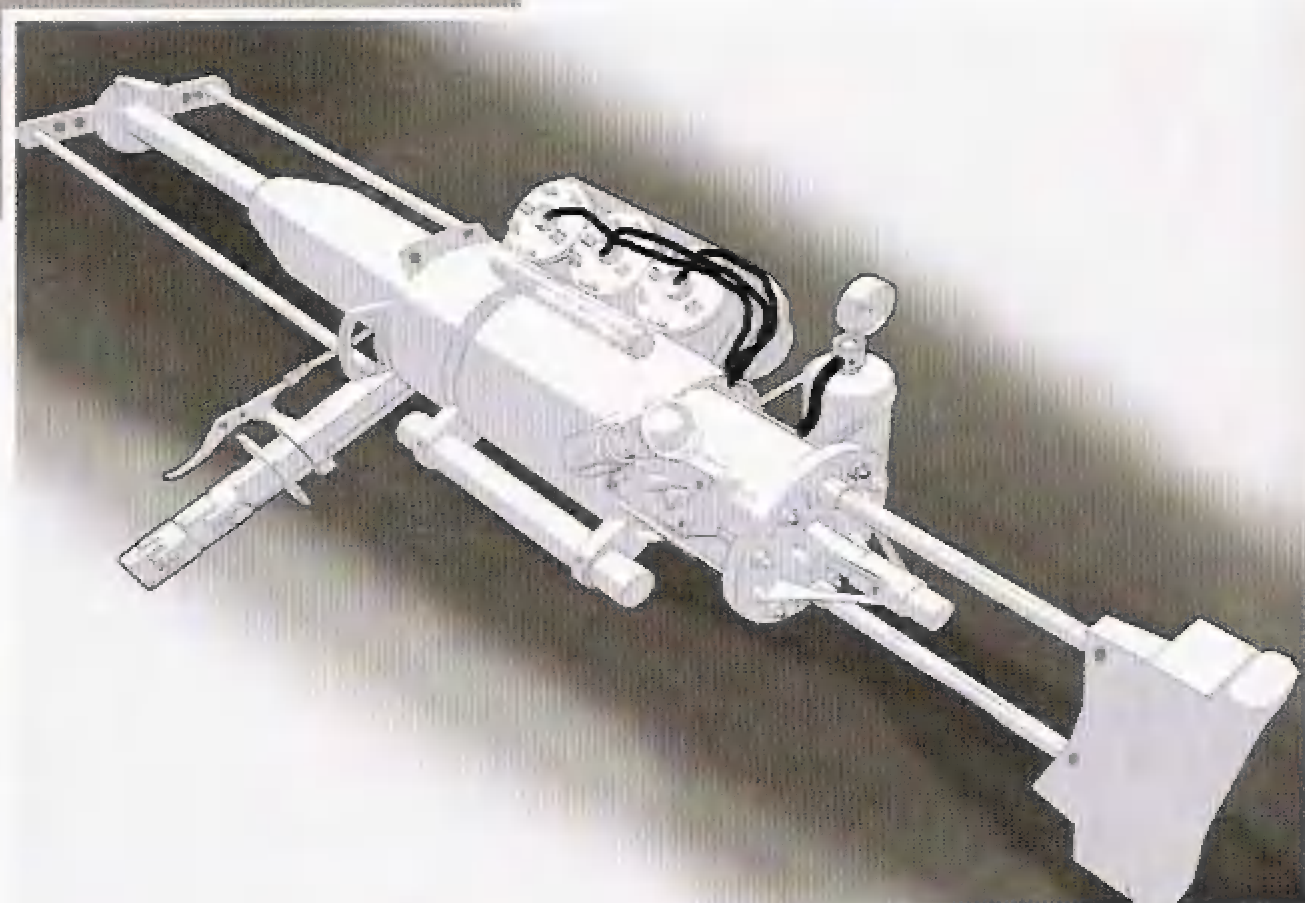
"The raid on the Tenements was the biggest challenge to build in the Trainstation maps. Our first fear, that players wouldn't realize they were supposed to run, turned out to be no problem at all. Playtesters would hear the citizens scream, see the first Metro Cop charge into the room, and turn and run immediately, often never looking back to see the Metro Cop knocking down the citizens. When the Metro Cops charged up the stairs in front of them, blocking the route they were intent on taking, we had multiple playtesters scream and panic, spinning on the spot looking for the way out. Most of our playtesters made it out alive the first time, and yet felt like they only just made it."

- Robin Walker

"We decided to add the Tenement apartments area because while we already had assets for the City 17 courtyards and the rooftops that connected to Dr. Kleiner's laboratory, we didn't have a solid connection between them. Since we wanted to end up in the attic space at the beginning of the rooftops, adding an interior building space seemed the right choice. The whole idea was that the citizens of City 17 would be wary of speaking to you on the streets under the watchful eye of the Combine, but they would speak more openly in the apartments where they live. The player would get further insight into the plight of the citizens of City 17, and a peek at life under Combine law." - Jeff Lane



Two conceptual designs for a resistance built "crossbow." It was designed to shoot a physically simulated bolt that allows the player to pin enemies to walls.



"The Headcrab canisters are an element that originally had a larger part in the story of *Half-Life 2*. The plan was that you would eventually arrive at the large artillery piece that the Combine used to launch the canisters. For various reasons that were not pursued, the canisters themselves remained. The canisters were used as a weapon by the Combine to cleanse an area of resistance, as well as make it uninhabitable." - Jeff Lane



Physics

The Source engine's physics system, headed by *Half-Life 2* project lead Jay Stelly, is integrated into every aspect of the game. Drop a heavy object onto someone's head and it hurts; scrape a metal piece against concrete and it makes appropriate sounds and sparks. Bodies fall as they should. Players tend to forget that it's a simulation as the physics seamlessly blend into the game and obey virtually every expectation, almost fading into the background in its completeness. This effect of overall immersion is something that can only be properly appreciated in its absence.

"I was watching a playtest, and they were just messing around, punting a tire swing back and forth trying to get it to loop over the top. They had it almost there, but not quite, so they ran forward to hit it again but missed and the tire ended up landing on their head killing them. They just sat there laughing, thinking it was the greatest thing in the world. It wasn't so much that the tire had killed them, but they had done it themselves; they had found a clever way of interacting with the world and the game had let them do it. It wasn't really so much about realism as it was about discovering how the game and the world were reacting to them in ways that they hadn't seen before, then finding out there were surprising and interesting consequences."

- Jay Stelly



"There are a number of things in the game that began life as a bug. One example is the helicopter's 'mega-bombing run' that happens in the final battle in the reservoir. While coding the helicopter's bull-rushing behavior (where it gets a bunch of distance from the player, turns around, starts shooting, and rushes toward the player), I accidentally had it dropping bombs instead of firing shots. It dropped so many bombs that it brought my machine to its knees, but the idea was so cool that I decided to make a version of it that could live within the performance budget." - Brian Jacobson









"Continual design iteration driven by experimentation and observation of test subjects playing the game is a big part of our process. One of the things we discovered during the development of Ravenholm was that people were having much more fun bringing Grigori's traps to the Zombies rather than the other way around. From this we derived the saw blades and explosive canisters littered around Ravenholm, a result we could not have predicted at the start." - Tom Leonard





"Puzzles are really useful devices for getting players to calm down after an exciting part of the game and focus on the details of the world around them. We build all this detail into the world and in many cases the player whizzes through it at a breakneck pace. Puzzles and 'down time' are like a sorbet in a multi-course meal, in that they allow the player to better appreciate whatever action comes next. Without those pacing contrasts, everything becomes a numbing blur of relentless action, which winds up being fatiguing and not very fun after a while." - Josh Weier

"I remember a specific moment that had a lasting effect on the design of the game. Kelly Bailey was playtesting a section of the Coast maps, and was in the last map before Nova Prospekt. He was terribly low on health and barely survived until he reached the next point of resupply. For the most part, this was something we had tried to avoid in the design up to this point. However, after that playtest, we all agreed that the added tension was incredibly powerful. From then on, the issue moved up our priority list. We took out lots of health and ammo that we had been 'bread-crumbling' in front of the player, and spent more time adding larger caches that were farther apart. The result was a lot more white-knuckle action, with every ammo cache seeming like manna from heaven." - Jeff Lane



"There was a period of time during playtests where the player was able to injure friendly civilians. At the same time, we had places in Coast where we needed to get the player out of the Buggy to experience a piece of detailed content. One of our first attempts at luring the player out of the Buggy was to have a citizen run out onto the road and wave the player down, yelling, 'Over here!' You can guess what came next." - Charlie Brown



"As with *Half-Life 1*, we crafted a pretty deliberate path through the world, but we also were careful to preserve the illusion of nonlinearity by sprinkling in rich, but optional, content—optional in that players could either miss it, or choose to move past it. There's a higher cost to building your world this way, but it really pays off in immersion and richness by giving players the ability to explore and reveal more of the world when they want to, peeling back new layers in the experience 'onion.'" - Dave Riller

Unlike *Half-Life*, it was decided to have no Hazard Course in *Half-Life 2*. Instead, to sustain the player's immersion in the world, training was designed directly into the progression of the game. Players discover that every basic skill is taught in a very unobtrusive way, especially early in the game. This includes simple challenges, like stacking the crates to get out of the window in the Trainstation, to more complex ones, such as the Antlion Pheropod "Bugbait" training in the Coast section. The difficulty of subsequent tasks could then be increased knowing that the player had been taught the mechanics they needed to succeed.

"We wanted to have citizens lead the player somewhere, so we set it up so they would tell the player where to go, then set off ahead. If the player fell behind, the citizen was supposed to turn around and remind the player by calling out, 'Let's go!' The first time we playtested, we had a bug where the leading citizen was a little overzealous in his desire to lead the player, and repeatedly called out, 'Let's go!' over and over again whenever the player wasn't right behind him. The playtester kept saying 'I know! All right! I'm coming! Jeez!', while behind him we were all trying unsuccessfully to stifle our laughter. From then on, it was a common occurrence around the office to hear someone repeatedly yelling, 'Let's go!' when waiting for someone." - Adrian Finol



"One of my favorite things to do with the Gravity Gun is to grab and hold Manhacks with it, and then run around using the spinning Manhack as a crude chainsaw. It's really useful in some of the prison turret defense areas, where there's a lot of Combine Soldiers coming at you, and manhacks dropping down from above. It's also pretty useful to pull health and ammo to you without leaving cover." - Robin Walker

"As players fought their way through the street-war maps, we wanted to make sure they knew what they were fighting for. We decided to add a scene with citizens pulling down a monitor while Breen was making a speech. Stopping combat to do this, even though the war was not over, would send a signal to the Combine, and to the player, that the citizens would stop at nothing to reclaim City 17." - Doug Wood







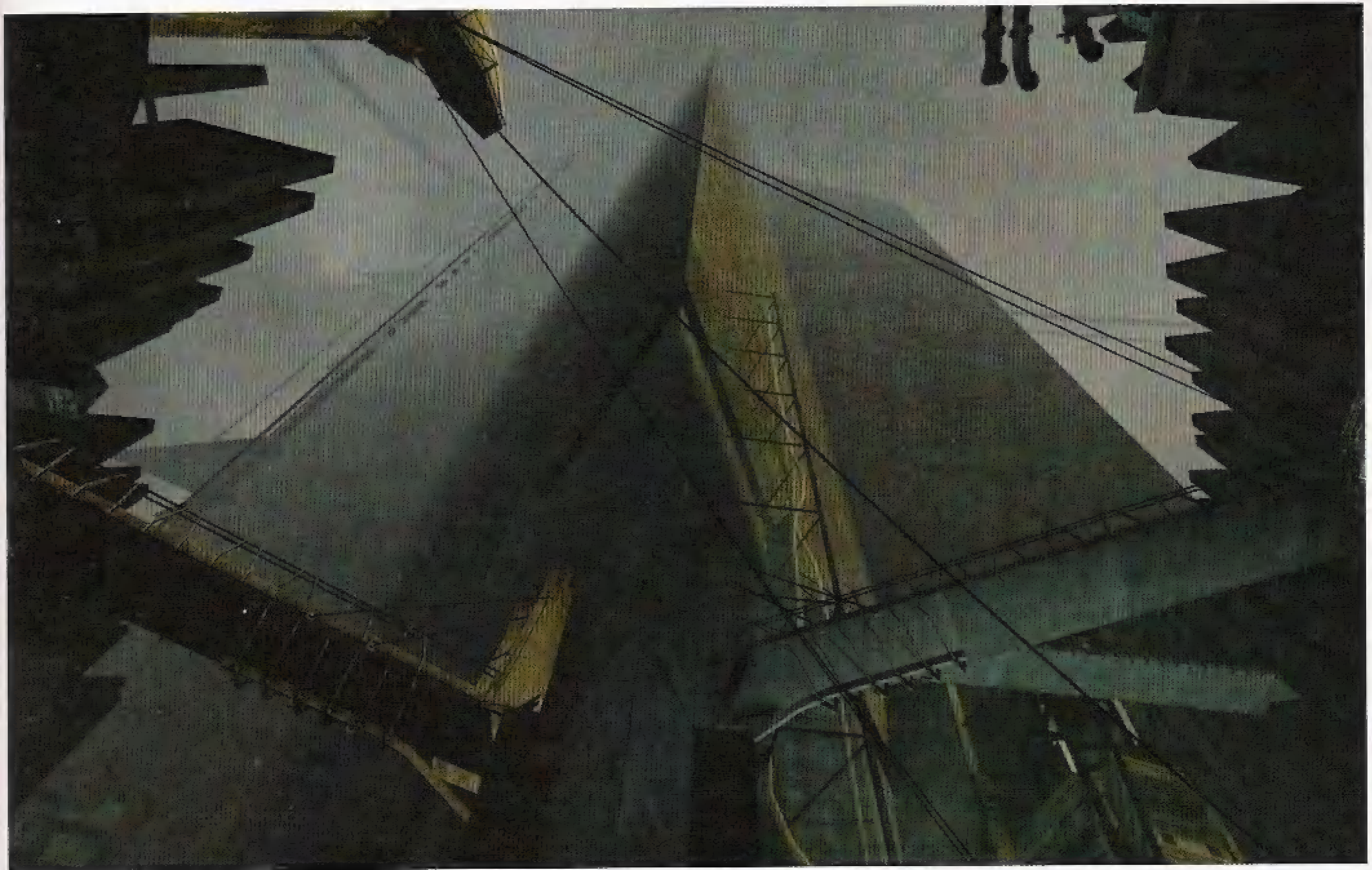
"One of the interesting differences between *Half-Life 1* and *2* is that with the first, we were largely unknown—often viewed as underdogs—and public expectations were low-to-none. With the critical success of the first game, all that changed. With *Half-Life 2*, expectations went out of control, even on our end. It became a real source of anxiety in trying to design and build the game that would live up to that new level of expectation; we had become our own worst competition." - Dave Riller

"The goal, when we were talking about *Half-Life 2* among ourselves, which is different than how you publicly talk about it, was that it simply had to be the best PC game of all time. The reason you talk about it in those terms is that people on the team need to know you're serious. Those aren't just made-up words, it's not a marketing slogan, it's what we actually need to achieve." - Gabe Newell

"The process of creating music for *HL2* was a lot of fun for me. Most of the music was created in my office using software to simulate a recording studio and instruments. For the most part, I try to think of a few words to describe a track, and keep that description in my head while I work on it. For instance, I might want 'fast action, suspense' or 'quiet exploration, mystery' or 'slow, disturbing, dark.' Then, each time I work on a track, I'll keep checking back to that description. It's easy for me to happily wander for a very long time while composing without reaching an end point; this method helps keep me focused and converging."

- Kelly Bailey

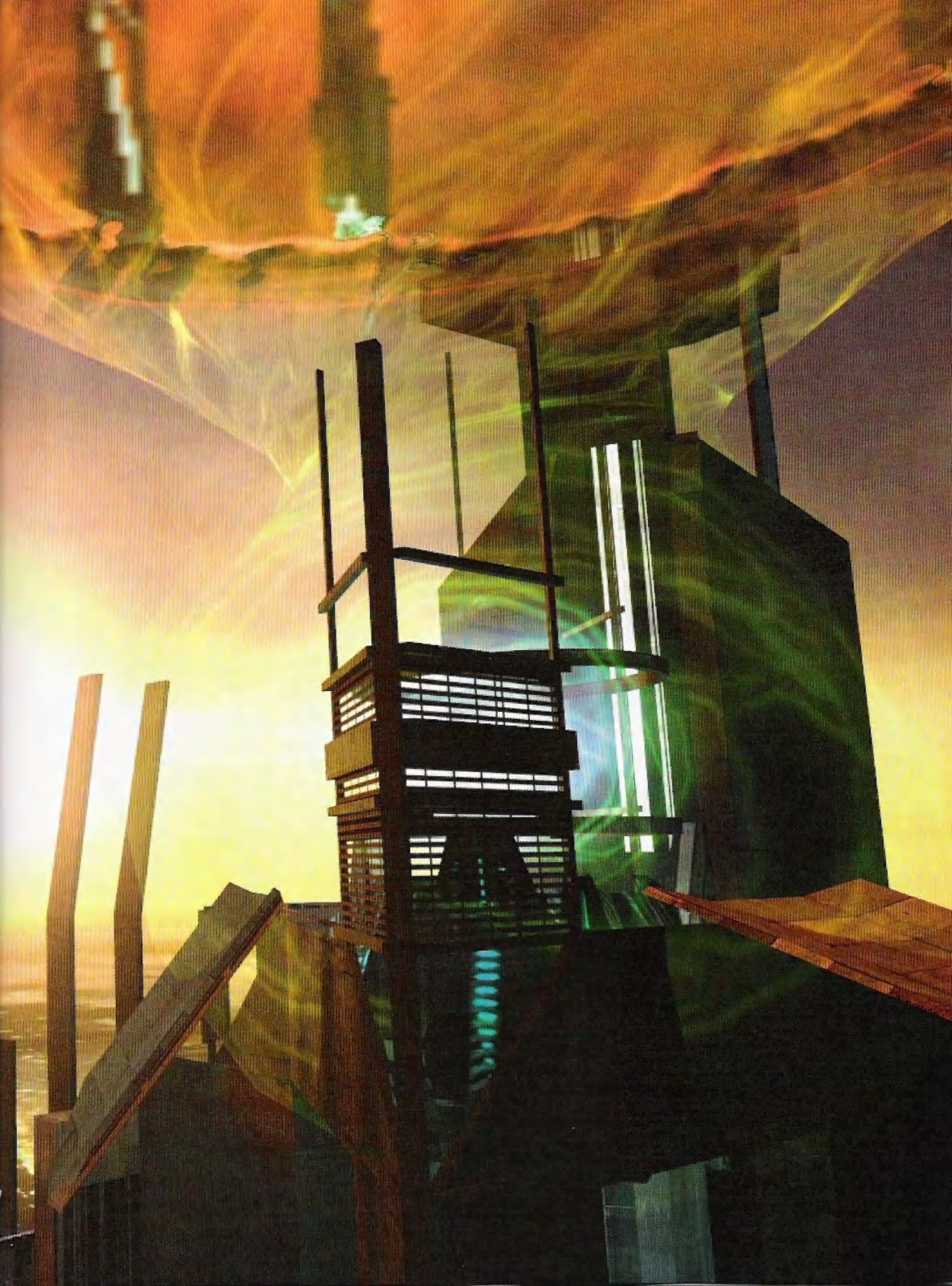




"Everything about the Citadel is invasive—it's digging into the ground beneath City 17 while its articulated walls rake outward, demolishing everything in their path. So you come out of a truncated sewer pipe that's now hanging out into the chasm that the Citadel created. Aaron Barber created the vista that you see when you first emerge from the pipe to see the Citadel looming above you and the colossal rift that it's created, then Jeff Lane and I added the precarious cliff crawl leading in. Part of our process involves handing things around so that eventually many people contribute to each encounter in the game. Originally we had citizens up on the street level shooting RPGs at the Citadel, and we were planning to have an all-out assault on the Citadel underway. But at a certain point it felt better to have the player all alone entering the Citadel, with the only sound being the eerie creaks and groans of the Citadel itself. It was more in keeping with the classic quest theme of a lone knight entering the fortress of the enemy, which was the feeling we were trying to evoke." - David Speyrer

"*Half-Life 1* gave us this great legacy to live up to. Have we done that, have we lived up to what everybody wanted out of the sequel to the game? I think we have. What makes me happy is when we sit people down who have high expectations for the game and they play it and afterward they say, 'Wow, that's great. That exceeded my expectations.' That's what we're looking for. Does it exceed their expectations? Because if it does, then I think we've succeeded in what we set out to do." - Gabe Newell







VALVE

Viktor Antonov
 Ted Backman
 Kelly Bailey
 Jeff Ballinger
 Matt Bamberger
 Aaron Barber
 Yahn Bernier
 Ken Birdwell
 Derrick Birum
 Chris Bokitch
 Steve Bond
 Matt Boone
 Charlie Brown
 Julie Caldwell
 Dario Casali
 Yvan Charpentier
 Jess Cliffe
 John Cook
 Greg Coomer
 Kellie Cosner
 Scott Dalton
 Kerry Davis
 Jason Deakins
 Ariel Díaz
 Quintin Doroquez
 Martha Draves
 Laura Dubuk
 Mike Dunkle

Rick Ellis
 Dhabih Eng
 Miles Estes
 Minh Le
 Adrian Finol
 Bill Fletcher
 Moby Francke
 Pat Goodwin
 Chris Grinstead
 John Guthrie
 Leslie Hall
 Damarcus Holbrook
 Tim Holt
 Brian Jacobson
 Erik Johnson
 Jakob Jungels
 Iikka Keranen
 Eric Kirchmer
 Marc Laidlaw
 Jeff Lane
 Minh Le
 Tom Leonard
 Doug Lombardi
 Randy Lundeen
 Scott Lynch
 Ido Magal
 Gary McTaggart
 John Morello II

Bryn Moslow
 Gabe Newell
 Tri Nguyen
 Jake Nicholson
 Martin Otten
 Kristen Perry
 Bay Raitt
 Alfred Reynolds
 Dave Riller
 Danika Rogers
 David Sawyer
 Aaron Seeler
 Nick Shaffner
 Taylor Sherman
 Eric Smith
 David Speyrer
 Jay Stelly
 Mikel Thompson
 Kelly Thornton
 Carl Uhlman
 Bill Van Buren
 KayLee Vogt
 Robin Walker
 Josh Weier
 Doug Wood
 Matt T Wood
 Matt Wright



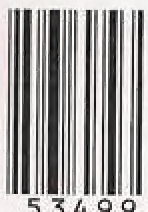


U.S. \$34.99 Can. \$49.95 U.K. £19.99

ISBN 0-7615-4364-3



9 780761 543640



5 3499



0 86874 54364 5